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6 January 1981

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 76

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U.S. NUCLEAR FUEL DELIVERIES TO INDIA

BK160223 Calcutta THE STATESMAN in English 3 Dec 80 p 8

[Editorial: "Truth About Tarapore"]

[Text] The prime minister made no revelation in her recent report to Parliament on the state of American fuel supplies for Tarapore [or] that a 19.8 ton shipment of enriched uranium had arrived in October had been reported at the time.

It was one of the two permitted by President Carter's executive order--and subsequently approved by the U.S. Senate, though not before adverse votes in the House of Representatives and in the foreign relations committees of both houses of congress. The final Senate decision was far from reassuring; one purchase order had been cleared after two years and the other after nearly a year, and it was clear that while the first shipment would not be further delayed, the second was unlikely to be made before further efforts to persuade India to accept fullscope safeguards. This is exactly what has happened. As Mrs Gandhi has disclosed, the second shipment has been "withheld" and made "subject to conditions extraneous to the cooperation agreement of 1963." Since these conditions are known to be unacceptable to India, and since the U.S. Congress is unlikely to be more accommodating now than it was in September, there is little prospect of early arrival of the second consignment. The fate of a consignment for delivery next year, for which an application was made towards the end of September, is still more uncertain. When, in September, the Senate approved President Carter's order permitting two shipments, the best that could be hoped for was that the Carter administration would see to it that both were made reasonably soon. But, apparently, subsequent talks in Washington between officials of the two governments were unproductive.

The Carter administration can hardly be expected to take any new initiative at this stage. Mr Reagan's, which will in any case take time to formulate its policy on specific issues, is unlikely to be more sympathetic, even if the new president does not share Mr Carter's obsessive concern over the alleged risk of weapons proliferation in the growth of civil nuclear programmes. Most important of all, the mood in Congress, which was disturbingly unhelpful during the discussions in September, is now almost certain to be more hostile. Barring an unforeseeable and major change, which could be brought about only by developments or considerations which must seem extremely unlikely now, there is therefore little scope for further nuclear cooperation between India and the United States, New Delhi may still wish to avoid doing anything that might prejudice future negotiations, as well as larger Indo-U.S. relations. Hence, apparently, the continuing reluctance to declare that the USA has already violated the 1963 agreement and that India is therefore free from such obligations as that not to reprocess spent fuel from the Tarapore power plant. While this circumspection is in order on both technical and political considerations, New Delhi will have to proceed on the assumption that the chances of further U.S. fuel supplies are very small. One alternative talked about for a long time is use of an indigenously fabricated mixed uranium-plutonium fuel to operate the Tarapore reactors. Since the prime minister has disclosed that the present stocks of enriched uranium will last till 1983-84, India still has more than three years to develop the new fuel and make any necessary reactor modifications for its use. If there is still any uncertainty, the possibility had better not be mentioned at all.

CSO: 5100

BRIEFS

ARGENTINA, FRG AGREEMENT--Buenos Aires, 5 Dec (TELAM)--A bilateral agreement regarding space and nuclear technology as well as research on medical, oceanographic, fishing, mining, geological and technical processes in industry has been signed between Argentina and the FRG. The meetings that were held in the past few days ended today with the signing of the agreement. The respective governments were represented by Raul Cura, Argentine under secretary of international economic affairs, and Reinhard Loosch, FRG minister of research and technology. It also was agreed to carry out studies in the immediate possibilities for the use of unconventional energy such as solar and biomass energy. [Text] [PY091741 Buenos Aires TELAM in Spanish 1430 GMT 6 Dec 80]

CSO: 5100

URANIUM MINING ADVOCATED FOR SOUTH

Perth THE WEST AUSTRALIAN in English 3 Nov 80 p 41

> [Text] Adelaide: The South Australian Mines and Energy Minister, Mr Goldsworthy, said yesterday that there was no reason why the mining and developing of the State's uranium resources should be delayed.

Mr Goldsworthy, who has been on an overseas uranium fact-finding mission, said he was satisfied that Sweden had found an answer to the problems of disposing of radioactive wastes.

He recently met representatives of the Swedish Nuclear Fuel Supply Co. and the Nuclear Safety Board.

He said he was shown plans for intermediate storage of spent fuel and reactor components and a repository for final disposal of waste in deep granitic rock.

Swedish legislation required that the owner of a nuclear reactor must demonstrate the feasibility of final storage of waste.

The Swedish Research and Development Works had now received government approval under this legislation and the country's nuclear power programme would be brought to full capacity before the end of the decade.

Mr Goldsworthy said that after a similar fact-finding trip early last year the former Labor Premier, Mr Dunstan, told Parliament that the Swedish waste-disposal system was on the point of being proved.

Mr Dunstan raised doubts because he had been told that the Swedish system could be applied only in areas that had similar formations of deep granitic rock. These occurred in only a few countries throughout the world.

Mr Goldsworthy said that since Mr Dunstan's overseas visit these developments had been proved to the satisfaction of the Swedish Government.

Referendum

A national referendum had approved the expansion of the country's nuclear power programme.

Mr Goldsworthy said: "I have also been assured that this method for final storage could be applied in other parts of the world.

"The granitic rock being used in Sweden's research and development is estimated to be 1600 million years old. Rocks of a similar age and older are known to exist in other parts of the world.

"In all these circumstances there is no reason to suggest that the mining and development of South Australia's uranium resources should be delayed because of problems of waste disposal."

CSO: 5100

TOWNSVILLE GROUP OPPOSES FRENCH URANIUM MINING

Court Appeal

Melbourne THE AGE in English 5 Nov 80 p 17

[Article by Russell Skelton: "Townsville N-Mine Challenged"]

[Text] Brisbane--A Townsville conservation group is mounting the first serious legal challenge to the granting of a uranium mining lease.

The group will ask the Queensland Mining Court to refuse the French-controlled company Minatome extra uranium leases on the Ben Lomond prospect near Townsville.

The Townsville Regional Conservation Council, with the backing of the Australian Conservation Foundation, will object to the proposed lease at a special hearing of the court at Charters Towers on 8 December.

But the court hearing may not resolve the issue. The State Mines Minister has the power to veto any decision of the court.

The council plans to call expert witnesses including Professor Sir Charles Kerr, a commissioner on the Ranger inquiry and Mr Hugh Sadler of the Australian National University.

A spokesman for the conservation council, Mr Adrian Jeffreys, claimed yesterday that conservationists believed the environment impact statement ordered when the first leases were granted at Ben Lomond four years ago was inadequate.

Mr Jeffreys said the new leases fell within the Burdekin Dam catchment area, one of Australia's largest water resources projects, which is also used for recreation.

The council will claim that it is not in the public interest for uranium leases to be granted until it can be demonstrated that the processing and distribution of uranium is safe.

Mr Jeffreys said it would argue also that wastes from the proposed mine could affect the environment and the health and well-being of mine workers.

Minatome applied for leases on an extra 2000 hectares last April. The application was advertised by the Government in August.

The present lease covers 128 hectares and the company has proved recoverable reserves of 2000 tonnes or uranium oxide worth about $130 million.

Minatome Prospects

Sydney THE SYDNEY MORNING HERALD in English 5 Nov 80 p 31

[Article by J. N. Pierce]

[Excerpts] Townsville, the humid north Queensland port through which more than $1 billion worth of minerals from Mount Isa and Greenvale were funnelled in the past financial year, is looking to a bigger involvement in minerals over the next few years.

If things go well, the mid-1980s could see the permanent resumption of phosphate rock from the vast Duchess deposits 760 kilometres to the west, the development of small but significant gold, silver, copper, silver-lead-zinc and uranium-molybdenum projects west of the hazy escarpment and the possible start of a major shale oil development at Julia Creek.

At present, roughly half of Townsville's annual exports of around 1.2 million tonnes is represented by the Mount Isa mine's output of refined copper, crude lead and zinc concentrate.

But on top of these basic, high tonnage operations, there are a number of smaller and significant mineral developments shaping up in Townsville's hinterland.

--Minatome Australia Pty Ltd, jointly owned by Pechine Ugine Kuhlmann Compagnie Francaise des Petroles (Total), has begun advertising for key senior staff to complete a feasibility study for a uranium-molybdenum project at Ben Lomond, 60 kilometres west of Townsville.

Minatome was granted the Ben Lomond lease by the Queensland Government last May and has since undertaken an active drilling program.

Minatome is looking at a project which would treat about 200,000 tonnes of ore a year for the production of 400 tonnes of uranium oxide and between 200 and 300 tonnes of molybdenum. The project would have a life of at least 10 years.

It expects that two years will be needed for the completion of the feasibility study and the granting of all the necessary permits and licences by the Federal Government.

If the Foreign Investment Review Board sticks by the strict rules, Minatome will have to relinquish a 75 per cent interest to Australians before it can obtain an export licence from the Federal Government.

If the Foreign Investment Review Board sticks by the strict rules, Minatome will have to relinquish a 75 per cent interest to Australians before it can obtain an export licence from the Federal Government.

Minatome's managing director, Mr Bernard Cahen, said yesterday that the company would comply with whatever the Federal Government required. "We have some possible Australian partners but are not yet in a position to disclose identities," he said.

CSO: 5100

EDITORIAL LAUDS UNION OK TO TRANSPORT URANIUM

Canberra THE AUSTRALIAN in English 11 Nov 80 p 8

[Editorial: "A Sensible Decision on Railing Uranium"]

[Text] A glimmer of sanity amid today's industrial turmoil is the decision by rank and file members of the Railway Station Officers Union in Queensland to defy their State Council's recommendation to block the transport of uranium yellowcake from the mines to the ports for export. Theirs is just one union among many still undecided on the uranium issue, but it is an important one, and the reasoning behind its difficult decision--which flies in the face of the ACTU--shows immense common sense.

The RSOU has decided in essence that it should take no action which would result in a loss of jobs of fellow unionists. Though they had the power to stop the transport of uranium dead, the railmen reasoned that the ultimate decision on whether to block uranium extraction belonged with the unionists at the mines – if the miners were opposed to uranium mining, then they should be the ones to call a halt.

Such an attitude is at the heart of genuine unionism which has been all too easily forgotten in the political stance taken by the majority of unionists over the past few years. Too often we have seen one branch of unionism hurtfully throwing another into turmoil in the pursuit of selfish, obscure or irrelevant aims. The oil tanker drivers and aircraft refuellers' strike which last night was threatening the jobs of thousands in the airline and related industries is an example of the "couldn't care less" attitudes often adopted by one body of unionists against another.

For the RSOU rank and file to take their responsible stand in defiance of a recommendation by their ruling body is even more worthy of praise. Some 58 per cent voted in favor of transporting yellowcake "as a general principle" and 64 per cent voted in favor of transporting all uranium ore, including that from Mary Kathleen.

The fact is that uranium mining is happening NOW. Nothing the railmen can do will change that. The Mary Kathleen mine in Queensland is at full production to supply overseas orders and mining is already a reality in the huge uranium developments in the Northern Territory. Thousands of workers--most of whom would describe themselves as good unionists--want to get on with the job without having to worry about their "brothers" in other parts of the nation undermining their and their families' livelihoods.

The RSOU vote, passed by a comfortable majority to allow uranium yellowcake to be transported by rail from Queensland and the Northern Territory to ports for transport overseas, calls into question the reason and the reasonableness of the ACTU's continuing determination to fight the mining and export of uranium. Simply put, the unions and unionists whose role it is to mine uranium want to mine uranium. That means a major sector of ACTU membership wants no part of the "stop uranium" campaign. With the move by the RSOU, and its recognition of the rights of fellow unionists to work at their jobs, a significant part of the membership involved in transporting uranium has also stated its view.

The ALP recently softened its line when the Leader of the Opposition, Mr Hayden, stated that he believed the questions of safeguards and agreements were "technical problems" and that "given time, and I would hope, not a great deal of time, they would be overcome".

This sensible approach, and that of the Queensland railmen yesterday, gives rise to hope that Australia will be able to make a reasonable contribution towards solving the energy crisis by developing its energy resources and making them available to those in need — under the appropriate safeguards.

CSO: 5100

PLANS OUTLINED FOR URANIUM PROCESSING PLANT

Perth THE WEST AUSTRALIAN in English 12 Nov 80 p 76

[Text] The partners in the Honeymoon uranium project near the South Australian-NSW border are hoping to gain State and Federal Government approval early next year to build a $5.5 million pilot processing plant on site.

The project would be the first in Australia to use solution mining, or a leaching method, to extract and process the uranium deposits for the export market.

Executives of the Brisbane-based company, Mines Administration Pty Ltd outlined plans for the project when they delivered a 74-page draft environmental impact statement to the South Australian government and the Federal Department of Home Affairs and the Environment.

Speaking in Adelaide, the company's general manager, Mr Malcolm Larkins, said the partners were hoping for government approval next January or February.

"The construction of the pilot plant is expected to take six to 12 months and we are hoping to begin production by mid-1982," he said.

"The construction of a full-scale commercial plant will depend on the results we gain from the pilot plant."

Mr Larkins said the pilot plant, which would be managed by his company, would operate initially at about a quarter of the production capacity of a full-scale venture.

It would operate for about 18 months and would then be increased to full capacity with the construction of additional facilities if the initial operation proved a success.

A full-scale commercial plant would operate for seven to 10 years, producing an average of 450 tonnes of uranium oxide a year as dried yellowcake for international markets.

Mr Larkins said it was too early to negotiate potential sales contracts and any product from the pilot plant would be stored on site.

The proposed mine site is 75 km north of Broken Hill in the sparsely-populated Lake Frome Basin on the South Australian side of the border.

The ore body covers 24 hectares and potentially recoverable reserves of uranium oxide are calculated to be 3384 tonnes at an average grade of 0.157 per cent.

CSO: 5100

BRIEFS

JAPAN URANIUM VENTURE--Uranium exploration field programmes have continued on schedule for the Pancontinental Power Reactor and Nuclear Development Corporation of Japan joint venture in the Northern Territory, SA and WA. [Text] [Perth THE WEST AUSTRALIAN in English 5 Nov 80 p 84]

URANIUM MARKET ACTIVITY--Uranium and mining stocks regained ground in quiet mixed trading on Australian share markets yesterday. Uranium issues to rise included Pancontinental, up 50c at $10.50, Kathleen Investments and Peko, up 20c and EZ, Mary Kathleen and Queensland Mines, all 10c higher. [Excerpts] Brisbane THE COURIER-MAIL in English 12 Nov 80 p 24] Melbourne--EZ Industries Ltd's balance sheet has been boosted by a $137.4 million net increase in reserves following a revaluation of the Ranger uranium project. The chairman, Sir Edward Cohen, revealed the revaluation to shareholders at the EZ annual meeting yesterday. The revaluation follows the purchase of the Federal Government's share of the Ranger project by the newly-floated Energy Resources of Australia Ltd. and the similar acquisition of EZ's stake. EZ exchanged its stake for shares and cash which "made it appropriate for us to bring to account our interest in the Ranger project at an assessed economic value," the chairman said. [Excerpt] [Brisbane THE COURIER-MAIL in English 12 Nov 80 p 25]

FIJI NUCLEAR OPPOSITION--The Fiji Government yesterday supported a plan by the Victorian secretary of the Amalgamated Metal Workers and Shipwrights Union, Mr John Halfpenny, to set up an independent Pacific trade-union forum. Fiji's Minister for Labor, Ratu David Toganivalu, told the opening of a three-day conference attended by 23 union leaders from nine Pacific countries that his Government would fully support such a body. It will mainly oppose French nuclear tests and Japanese plans to dump nuclear waste in the Pacific. The countries represented would be Australia, Fiji, Guam, Hawaii, Japan, Kiribati, New Caledonia, New Zealand and Vanuatu. Ratu David said the French Government did not publish official statistics about the incidence of leukemia among workers on Muroroa Atoll. But visitors keep coming to us with worrying tales of relatives and friends who have been there and are dying of cancer," he said. There were American and Russian nuclear-powered vessels in the Pacific and if these ships were wrecked there was a danger of contamination. He said Pacific Ocean resources were all too precious. "If our ocean is ruined our life-support system fails. We shall die." [By Vijendra Kumar] [Text] [Canberra THE AUSTRALIAN in English 13 Nov 80 p 3]

URANIUM MINE EXPANSION--The Deputy Prime Minister, Mr Anthony, yesterday hinted strongly that the Government would soon approve more uranium mines. In a speech in Canberra to welcome A French trade mission, Mr Anthony detailed Australia's current uranium development. He said production from Mary Kathleen, Nabarlek, Ranger and Yeelirie was virtually committed. "Such commitments are a statement of faith and confidence in Australia, and in Australia's reliability and capacity to supply," Mr Anthony said. "The position has now been reached where additional uranium projects should proceed so that the momentum of Australia's advance into the world market can be maintained." [Text] [Melbourne THE AGE in English 13 Nov 80 p 23]

CSO: 5100

RAO ATTACKS PAKISTAN'S NUCLEAR WEAPONS EFFORTS

BK120921 Delhi Domestic Service in English 0830 GMT 12 Dec 80

[Text] The government is taking all necessary steps to safeguard the country's security in view of reports in the world press that Pakistan is trying to make a nuclear device. This was reiterated by External Affairs Minister Narasimha Rao in the Rajya Sabha today. He was replying to a calling attention notice on the reported illegal transfer of U.S. made electronic equipment to Pakistan through Canada which can be used for developing atomic weapons. The motion was raised by Shiv Chandra Jha, Janata, and 44 others representing all sides of the house.

Narasimha Rao stated that according to government's information Pakistan has been trying to acquire uranium enrichment capability and also the technology to reprocess nuclear fuel which could enable it to develop atomic weapons. To build up uranium enrichment and nuclear reprocessing facilities, Pakistan is believed to have imported vital equipment from various European countries in a clandestine manner. Recent disclosure about the shipment of U.S.-made electronic equipment to Pakistan via Canada is one of the many reports appeared in the world press in the past several months about procurement of equipment by Pakistan which could be used for building up her nuclear capability.

Narasimha Rao informed the house that according to the latest information three persons have been charged before a criminal court in Canada for exporting strategic electronic equipment illegally to Pakistan. He said they are now Canadian citizens; one of them is of Indian origin and another of Pakistan.

Narasimha Rao, however, hoped that the Government of Pakistan would abide by its assurances that its nuclear program is solely directed toward peaceful purposes and has no nonpeaceful dimensions. He also hoped that Pakistan would decist from any action which would disturb the peace and stability in the subcontinent and impair the process of normalization of mutual relations.

Initiating the discussion, Shiv Chandra Jha criticized the United States for its endeavor to weaken India by strengthening its neighbors. Prime Minister Mrs Gandhi was present when the house took up the call attention notice for discussion.

CSO: 5100

BRIEFS

HEAVY WATER SELF-SUFFICIENCY--New Delhi, Dec 5: Indian Premier Indira Gandhi told Parliament yesterday that India would be fully self sufficient in the production of heavy water needed for nuclear power plants when existing and proposed heavy water plants were fully commissioned. She said that at present there were some snags in the completion of certain plants. But when all the plants functioned fully, there would be no deficit of heavy water in India. Mrs. Gandhi also said a fast breeder test reactor, now being built at Kalpakkam near Madras, would help research into the feasibility of power generation in India using fast breeder technology. The Prime Minister added that the Hyderabad nuclear fuel complex was being expanded at an estimated cost of over 130 million rupees (over 6 million dollars). At present, it can make 100 tons of finished fuel per year and this figure was being raised to 210 tons.--AFP [Text] [Karachi DAWN in English 6 Dec 80 p 9]

DISCOVERY MEETS URANIUM NEEDS--New Delhi, Dec 17 (AFP)--Adequate uranium and other raw material resources to meet requirements of the nuclear power programme currently envisaged have been discovered in India, Parliament was informed today. Junior Minister for Science and Technology C.P.N. Singh told the lower house that intensive surveys and exploration conducted by the mineral division of the Department of Atomic Energy have resulted in the identification of a number of new uranium deposits, in addition to the already known Singhbhum thrust belt in Bihar state. He also assured the house that lapses in the nuclear energy policy during the last three years have been rectified. In reply to a question, Mr Singh said a fast breeder test reactor with French collaboration was under construction at Kalpakkam, in Tamil Nadu, in the south, at an estimated cost of 587 million rupees (over $73 million). [Text] [BK171633 Hong Kong AFP in English 1225 GMT 17 Dec 80]

CSO: 5100

COUNTRY HOPES FOR 'AMICABLE AGREEMENT' ON NUCLEAR WASTE DISPOSAL

Canberra THE FINANCIAL AUSTRALIAN in English 3 Nov 80 p 3

[Article by Des Keegan: "Japan Insists on Using Pacific as Nuclear Dump"]

[Text] The Japanese Government will press on with large scale dumping of low level nuclear waste in the Pacific Ocean, but will store the material temporarily in Japan.

The Minister of International Trade and Industry, Mr R. Tanaka, said last week Japan had no other means of disposal and would continue efforts to win agreement with Pacific Islanders.

He said the nuclear waste would be held in hermetically-sealed concrete containers in Japanese power stations pending amicable agreement with the islanders.

Japan was forced to dump the material in the Pacific rather than in local coastal waters because of international commitments.

The London conference of the International Atomic Energy Agency stipulated that waste must be dumped in at least 4000m of water.

That ruled out Japanese waters and forced selection of deeper water in the Pacific Ocean.

Mr Tanaka said the waste was low grade and harmless.

Japan plans to cut its dependence on oil to 50 per cent of total energy needs within 10 years by substituting nuclear power, coal and other sources.

In 10 years, Japan hoped to have nuclear power capacity of 51 to 53 million kilowatt hours installed and could even reach 60 MKW.

Australian suppliers have been integrated into the power scheme to supply 4 per cent of the uranium--about 1000 tonnes of oxide a year.

That would be increased later in the 1990s, but Australia is very much a latecomer and would start with a small share.

Japan also planned to import 143.5 million tonnes of coal, with about 53.5 million tonnes in steaming coal, Mr Tanaka said.

Australia's share would be very significant.

Mr Tanaka said he was aware of the desire of the Australian Government to have Japan share some of the cost of infrastructure for coal loaders and so on.

Mr Tanaka met the Prime Minister, Mr Fraser, the Deputy Prime Minister, Mr Anthony, and the Minister for Industry and Commerce, Mr Lynch, last week before visiting the Pilbara and other Australian centres.

He said Japan was hopeful of concluding a nuclear agreement with Australia soon and an Australian mission would visit Japan in December.

He stressed that Japan and Australia would need to cooperate in resource development.

CSO: 5100

BRIEFS

NUCLEAR ENERGY ALTERNATIVE--Tokyo 9 Dec (KYODO)-- A government sponsored group of scientists and industrial representatives met here Tuesday and called for positive development of nuclear fusion as an alternative energy for oil. The first meeting on nuclear fusion was held at a hotel under the sponsorship of the Education Ministry at the initiative of Education Minister Tatso Tanaka. Tanaka told the meeting that it is the most important matter for Japan, poor in resources, to promote scientific technology, stressing the necessity of scientific research and development. Former Prime Minister Takeo Fukuda, who was present at the meeting, said the nation must develop an alternative energy for oil and gave his views that nuclear fusion is the most promising as a new energy. Scientists at Kyoto and Osaka universities reported their respective research on nuclear fusion. Industrial representatives demanded more involvement in the research and development of nuclear fusion. Education Minister Tanaka said that he has no plan at present to hold similar meetings on a regular basis. [Text] [Tokyo KYODO in English 1132 GMT 9 Dec 80 OW]

CSO: 5100

NEW REACTOR WILL HAVE ADEQUATE WASTE DISPOSAL FACILITIES

Kuala Lumpur NEW SUNDAY TIMES in English 9 Nov 80 pp 9, 12

[Text] KUALA LUMPUR, Sat. — A large private pond — and NOT the Klang Valley's main source of drinking water — will be the dumping ground for waste from Malaysia's first nuclear reactor at Bangi.

And by the time the waste gets into the pond, it will have lost almost all its radioactive content anyway.

"We're going to rear fish in that pond and turn the place into a beauty spot," Dr Noramly Muslim, the director of Puspati (Tun Ismail Atomic Research Centre), said yesterday.

Fears that the Sungei Langat would be polluted by radioactive waste were raised last week at a conservation seminar where participants were apparently told the radioactivity level in the river would be "within acceptable limits."

Dr Noramly has been quick to allay fears that the Sungai Langat will be the reactor's dumping ground. Liquid, solid and gaseous radioactive waste from the reactor will be treated accordingly.

It is the liquid waste, kept in storage tanks first and possibly chemically treated, which will be drained into the pond within the centre's 66-acre site near the Universiti Kebangsaan. It will be discharged only when its radioactive level is below permissible levels.

Leftover sludge from the chemical treatment and solids will be stored in shielded containers at Puspati's waste treatment centre. Solid wastes include air filters, ion-exchange resins, irradiated samples, tissue paper, plastics, protective clothing and tools which have been contaminated.

Gaseous waste escapes into the air through the chimney. Dr Noramly said the two major radioactive gases — Nitrogen-16 and Argon-41 — decay or lose their radioactivity so quickly that by the time they reach the chimney they will be harmless. Any radioactive gas that does reach the air is diluted, he said.

"In the isotope production cells themselves, the main gaseous waste is Iodine-131, but this will pass through a series of filters which will absorb the iodine," said Dr Noramly.

Not content with in-plant safety measures, Puspati will regularly monitor radioactive levels in its gaseous and liquid wastes as well as in a wide area surrounding the centre.

Samples of river water, drinking water, rain water, food crops, vegetation and river organism will be collected and analysed. This environmental surveillance programme is expected to begin before the reactor goes into operation in early 1982. In this way, Puspati will have pre-reactor records of radioactivity levels.

"This programme will continue throughout the lifetime of the reactor," Dr Noramly said. "Fellow-scientists have accused me of being overcautious. Well, I prefer it that way even though the research reactor we will be using is supposed to be one of the safest available."

The reactor is an American Triga Mark II model costing $6 million. The Triga — Training, Research, Isotope, General Atomic — reactor is designed specially for training and research in nuclear science and technology as well as isotope production.

It uses a uranium-zinconium hydride fuel-moderator material, considered one of the safest fuel combinations for research.

In addition, any sudden big change in heat production in the reactor will heat both the fuel and moderator simultaneously, resulting in a less efficient fuel. The reactor will then promptly return to its normal operating power.

"Apart from installing radiation monitors for early warning to enable immediate remedial action, all laboratories will be kept at negative pressure," Dr Noramly said. "This means there will be no leakage of air from the laboratories."

Puspati will produce 12 types of radioisotopes for use in medicine, industry, agriculture, hydrology and research.

Radioisotopes are an essential part of the diagnostic procedure in medicine. Diagnosis can be accomplished through the use of radio-pharmaceuticals which are mainly applied to thyroid, hepatic, renal, mineral metabolism, regional blood flow and cardiac studies.

In industry and research, radioisotopes are used as tracers in, for instance, mixing fluids, powders and gases.

The entire Puspati centre is expected to cost about $22 million. The 24.76 kilos of uranium containing fuel elements for the reactor are expected to arrive next October.

In four years, Puspati should have produced about $1 million worth of radioisotopes. In 1977, Malaysia imported about $150,000 worth of radioisotopes.

CSO: 5100

NUCLEAR PROGRAM EXAMINED BY BULANTSEV

LD181112 Moscow TASS in English 1038 GMT 18 Dec 80

["Dangerous Ambitions"--TASS headline]

[Text] Moscow, 18 Dec, TASS--TASS commentator Sergey Bulantsev writes: Indian leaders recently have more than once expressed serious anxiety over nuclear preparations by Pakistan's military administration.

Thus, last Tuesday Premier Indira Gandhi declared that India was closely watching Pakistan's nuclear arming. Earlier, External Affairs Minister V.P. Narasimha Rao said in Parliament that the Indian Government knew of Pakistan's nuclear preparations and its intentions to manufacture atom bombs.

The Pakistani administration declared more than once that it was not going to develop atomic energy for military purposes and was not going to manufacture nuclear weapons. Numerous testimonies of the international press, however, furnish serious foundations to question the sincerity of such reassurances. Recent reports that Pakistan is getting from the West electronic equipment necessary for the development of nuclear weapons, for instance, met with a big response from the public. Earlier, in May last, the Pakistani president was reassured at talks in Beijing that China would help him to join the "nuclear club."

Three Pakistanis, travelling on diplomatic passports, were recently arrested in Montreal, the CANADIAN PRESS news agency reported a few days ago. They tried secretly to carry devices for the manufacture of atom bombs to Pakistan. Documents on nuclear technology and the manufacture of atomic weapons were seized from one of the "diplomats" at the time of his arrest; he turned out to be a representative of the Pakistani Atomic Energy Commission. Special interest of the CANADIAN PRESS was aroused by the fact that the seized equipment was U.S.-made. In this context, the PRESS voices the opinion that the principal persons involved in this sinister affair are in the United States, while Canada in this case was used as a staging post for the shipment of American equipment to Pakistan.

As for nuclear raw materials, according to the UPI agency, in the period after 1977 Pakistan has purchased 368 tons of partly dressed uranium ore directly or though third countries. Well-informed quarters believe, the Hong Kong ASIA WEEK writes in this context, that Islamabad's expenditures on the nuclear programme with the object of making their own nuclear bomb already exceeded 2,000 million dollars.

All these facts enabled the Indian press to draw the conclusion that Islamabad already has everything needed for the manufacture of 5-7 atom bombs or will have it before long.

There is hardly any need to prove that hazards for the cause of peace in Asia and throughout the world would result from the appearance of the atom bomb in the hands of the military rulers of Pakistan. Above all, this would create a serious threat to India and the other neighbours of Pakistan. The nuclear arms race, inevitable in such a case in South Asia, would set up another seat of international tension, fraught with the most dangerous consequences to the peaceful life of millions of people in the region. The entire responsibility for such developments would rest with the Pakistani administration, and also with China and those western countries that encourage Islamabad's nuclear amitions.

CSO: 5100

CALL TO RECONSIDER CHASMA NUCLEAR COMPLEX

Karachi MORNING NEWS in English 13 Dec 80 p 3

[Article by Shahidur Rehman]

St Paul (USA), Dec. 12: Dr I. H. Usmani, former Chairman of the Pakistan's Atomic Energy Commission, has asked President General Zia-ul-Haq to appoint a high-powered commission to reconsider all the aspects of setting up a proposed nuclear complex at Chashma on River Indus in the Mianwali district.

"In my opinion and the opinion of the most outstanding geologists appointed consultant by PAEC, Chashma barrage site for the nuclear complex is a very serious seismological risk", he said in an interview with MORNING NEWS.

Dr Usmani, currently Interregional Energy Adviser for UN, was invited by Macalester College, St Paul, to speak on the energy crisis.

He said that he has written a letter to President General Zia-ul-Haq seeking his indulgence before the perspective plan of PAEC envisaging setting up of 8 nuclear plants at Chashma, becomes irreversible.

Dr Usmani pointed out if God forbid, any accident similar to Three Miles island in USA occurs at Chashma site, it would contaminate the Indus River for 24,000 years, completely ruining life and economy in Pakistan. He said his objections to Chashma site stem from the observations of Geology Laboratory of Columbia University which was appointed consultant by the PAEC to oversee its plans.

According to Dr Usmani, the consultants have commented that the complex is being built at "Chashma seismic fault" which could be very dangerous in the event of an earthquake.

Dr Usmani was instrumental in the setting up of the research reactor at PINSTECH and KANUPP at Karachi.

He lamented that while PAEC has failed to add to the nuclear power capacity, the only nuclear plant at KANUPP was also out of work because of the unrealistic plans prepared by the PAEC.

He argued that the complex should be built on a site where it would cause minimum damage by way of contamination to human life in the event of a nuclear leakage or accident. He gave three arguments against the decision of locating the site at Chashma.

1. In the event of a damage through accident it would inflict irrepairable damage to human life.

2. It would be the prime target in the event of a war.

3. Damage would be higher at Chashma than at any other place if it is damaged through sabotage.

He was of the opinion that Pakistan's nuclear complex should be located in the south somewhere on the Makran coast while hydel energy projects should all be in the north.

Poor Planning

Dr Usmani accused Atomic Energy Commission of slogan mongering and making tall and false claims and for playing to the gallery. In his view PAEC also chalked out unrealistic plans which were misunderstood by the Western countries.

It was bad planning and decisions regarding the nuclear policy which made Pakistan's nuclear plan, a target of criticism and controversy all over the world, he mantained. [as published]

While talking about his preference to locate the complex at Makran coast, Dr Usmani said it might be argued that a coastal site would be an easy target for enemy missiles. In present day wars, distance have become meaningless as missiles could be fired with bull's eye accuracy from thousand of miles, he pointed out.

The high-powered commission (suggested by Dr Usmani in his letter to the President of Pakistan) should be headed by a judge of Supreme Court and it could even seek advice of International Atomic Agency, he said.

Energy Ministry

Dr Usmani also called upon the President of Pakistan to establish a full-fledged Energy Ministry to chalk out a comprehensive policy for energy.

Elaborating his assertion that PAEC was responsible for making Pakistan's nuclear policy controversial abroad, Dr Usmani said total plutonium produced by KANUPP was 15 tons per annum, and it was therefore natural for western countries to be suspicious of our nuclear plan when PAEC started shopping for a reprocessing plant of 100 tons capacity.

He was of the view that Pakistan would have succeeded in securing a reprocessing plant of lesser size.

Similarly, he said, the perspective plan of PAEC to add one nuclear reactor every second year during the rest of the two decades of the present century was also unrealistic. One nuclear reactor of 2,000 MW costs one billion dollars.
It was this unrealism which has made our nuclear plan a laughing stock abroad, he opined.

Dr Usmani thought that Pakistan should also try to develop technology for solar energy. In this connection, the United Nations had already sanctioned 2.5 million dollars for setting up demonstration projects and solar R&D (Research and Development) laboratories in Pakistan. The amount would become available to Pakistan as soon as these projects are approved by the Pakistan Government.

Dr Usmani has been instrumental in promoting the use of photo voltic cell for various energy uses. Although its present price was really high, he was hopeful the next few years would witness a big reduction in its price through R&D and increased consumption.

CSO: 5100

DEVELOPMENT OF NUCLEAR POWERPLANTS NOTED

OW160620 Taipei International Service in English 0100 GMT 15 Dec 80

[Text] In Taipei it is reported that the Republic of China is vigorously diversifying its energy resources with particular emphasis on building more nuclear plants. Officials said: The government plans to increase its nuclear reactors from 2 to 26 by the turn of the century. The output of these reactors will represent 40 percent of the ROC's total power consumption.

The Republic of China, almost totally without natural resources, depends heavily on oil for its energy. Officials said power generated by the existing 2 nuclear reactors is 600 megawatts each, representing only 16 percent of the ROC's power output, coal, 12 percent, and hydroelectric, 10 percent. (Bruce Pao-hsi Chu), vice president of the Taiwan Power Company, said: 4 nuclear reactors with 1,000 megawatts each are now under construction and are expected to be completed in 1985. Thereafter, he said, the Republic of China will rebuild a 1,000 megawatt nuclear reactor each year until the year 2000 to reduce its dependency on oil. In an interview, (Chu) said that by then these nuclear plants will generate 50 percent of ROC's power consumption with oil only 27 percent, coal 16 percent, and hydroelectric 7 percent. He said: Nuclear powerplants have become increasingly important for the Republic of China because of the uncertain political situation in the Middle East.

CSO: 5100

NEW NUCLEAR REACTOR COMMISSIONED

AU181220 Sofia BTA in English 0840 GMT 18 Dec 80

[Text] Sofia, 18 Dec (BTA)--The third reactor of the "Kozloduy" atomic electric power station, with a capacity of 440 megawatt, was commissioned yesterday. Now the "Kozloduy" atmoic electric power station, the first reactor of which was switched into the power grid in 1974, is Bulgaria's biggest electric power station. With its 1320 megawatts it outbeat the previous supremacy of the "Varna" thermo-electric power station.

The three reactors of the atomic electric power station will be producing about 30 million kwh of electric power every day-and-night. The "Kozloduy" atomic electric power station already produces 20 percent of the total electric output of Bulgaria.

Next year the fourth reaction of the station will be brought on stream too. The programme for speeded-up development of the atomic power generation, which has been approved by the government, provides for a step-by-step building of new high capacities. The first 1000-megawatt reactor of the station will be completed in the 1984-1985 period, which is under construction now. By 1987-1988 another reactor of the same kind will "add" its atomic power into the Bulgarian power system. So in 1990 almost half--about 40 percent--of the electric power of Bulgaria will be produced at atomic electric power station.

CSO: 5100

CHILE

BRIEFS

URANIUM, COPPER EXTRACTION--Mining Minister Carlos Quinones told newsmen during the inauguration ceremony of the Lo Aguirre copper field that an increase of the copper price is expected in January. Regarding uranium which reportedly will be extracted at the Las Cascadas field, he said that the radioactive mineral is reserved for the state and so far no request has been made or authorization given for its exploitation or export. [Excerpt] [PY160156 Santiago Chile Domestic Service in Spanish 2300 GMT 15 Dec 80]

CSO: 5100

GRAEF FERNANDEZ: OUR FUTURE LIES IN NUCLEAR POWER

Mexico City EL DIA in Spanish 12 Nov 80 p 9

[Report on interview with Dr Carlos Graef Fernandez, 1970 National Science Prizewinner, manager of the fuel cycle in Mexican Uranium, a state enterprise, by Sadot Fabila Alva; date and place of interview not given]

[Text] On the eve of the publication of the National Nucleoelectric Plan, Dr Carlos Graef Fernandez stated his position to the effect that Mexico should use both lines for generating power of a nuclear origin: natural uranium with heavy water and enriched uranium, in order not to depend on one single technology.

Graef Fernandez was honored, on 10 November, by President Lopez Portillo with the "For Nuclear Merit" medal. In 1970, he was awarded the National Science Prize. He holds the degree of Doctor of Philosophy from the Massachusetts Institute of Technology. He was president of the Mexican Physics Society and of the Mexican Culture Seminar. In 1969, he was president of the United Nations Group of Experts on Nuclear Energy, and, in 1974, was emeritus professor in the College of Sciences of the UNAM [National Autonomous University of Mexico]. At present, he holds the post of manager of the fuel cycle in Mexican Uranium, a state enterprise.

When he was interviewed, he stated that we are lagging in the construction of nucleoelectric powerplants with regard to power generating capacity predicted for the immediate future based on those plants. This will necessarily result in more oil burned and in the development of coal-fired electric powerplants to handle the shortage.

He also admitted the presence of a trend against nuclear development in Mexico, which believes that we have enough oil to meet our electricity requirements and it also maintains that we lack atomic technology, which entails risks to mankind.

"I believe that these persons are wrong." When he pointed out that "it is a blessing that we have oil," he said that the only guarantee known up to now for a supply of power in the future is nuclear energy.

Known alternative sources -- wind power and solar power -- solve local, only domestic problems and, with regard to geothermal power, 2,000 megawatts can be obtained by the year 2000, according to estimates by experts. This is insufficient for demand at that time, taking into account the power that can be obtained from hydroelectric and thermoelectric powerplants.

Nevertheless, in spite of that opposing trend, he pointed out that most stimulation was given to nuclear development precisely with President Lopez Portillo, when he was director of the Federal Electricity Commission.

He stated that the Laguna Verde plant, in Veracruz, will be able to go on line by 1983 with a generating capacity of 1,300 megawatts.

Effort being made at present is being concentrated on completing the Laguna Verde plant and on exploring, prospecting and quantifying our uranium resources and on construction of a processing plant in Chihuahua to produce 150 metric tons of concentrated uranium a year. This plant may be finished before the end of 1982.

Incalculable Uranium Reserves

Proved uranium reserves have been estimated at 9,500 metric tons. He stated that a sizable amount of deposits found recently in Tlaxiaco Valley, Oaxaca, and in the phosphoric rock production area of San Juan de la Costa and Santo Domingo, in South Baja California, must be added to this.

At these last two places, San Juan de la Costa and Santo Domingo, "we have an unlimited source of uranium, on the order of 151,000 metric tons." The region has very favorable conditions for exploitation, owing to the extraction of phosphoric rock -- for fertilizers -- with which the cost of extraction is lowered considerably. Therefore, he remarked, "we are not frightened by the challenge of having 20 or more nuclear powerplants in this country."

He remarked that Mexico's entrance in the nuclear age represents an enormous possibility for technological development in the various aspects of engineering -- physics, chemistry, geology, metallurgy and, especially, the training of a rather considerable number of middle-level technicians required so much by Mexico in this stage of industrial "takeoff." Entrance in the nuclear age "is a very strong incentive to Mexican technology."

The Atomic Club and Technology

Graef Fernandez stated that we must implement a transfer of technology as soon as possible in this very complex branch of modern science. He said that it is urgently necessary to produce the fuel element -- to build a plant that will convert uranium concentrate into uranium hexafluoride -- but this requires a division of the task in time.

We cannot do more than this. Uranium enrichment is possible already for those who have atomic technology in their possession: the United States, France, Germany, the Soviet Union, Canada and associates of these countries, Sweden, England and Holland.

He said that from the time when we contracted with the United States for the purchase of reactors for Laguna Verde to the present date, possibilities of "options" for acquiring one or more nuclear plants have opened up considerably, but the most that we have been offered is to be shareholders: the ERODIF plant in southern France, or to sell us the service: the United States.

France, at least, "has opened up its facilities to us," but it is a question of an atomic plant consuming 3,600 megawatts, an amount of power greater than what is consumed by the entire Valley of Mexico. That is to say that we could not have atomic uranium enrichment facilities even if we had technology transfer capabilities, he stated.

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CSO: 5100

ENERGY DEFICIT FORESEEN IN 15 YEARS WITHOUT NUCLEAR ENERGY

Montevideo EL PAIS in Spanish 12 Oct 80 p 24

[Article by S.K.: "We Must Extract Uranium From Our Sea"]

[Text] Within 10 years, Uruguay could count on nuclear energy as its most effective alternative energy source to oil. By the year 2000, even with Salto Grande and Palmar fully operative, our country's energy deficit will be of the order of 600 megawatts annually, if we consider that demand will increase at an average rate of 6 percent annually over the next 15 years. Uruguay has in its sea a resource it has not yet exploited: uranium. It is present in a practically constant concentration of 3 kilos per 1,000 cubic meters of water throughout the seas of the world. The price of 1 kilo of uranium (approximately $100) is the same as that of 1 ton of heavy fuel oil. These were some of the statements made to EL PAIS by government adviser Engineer Mario Jorge Coppetti, a dedicated researcher on energy problems, especially nuclear power.

During an extensive dialog held in his office in the Legislative Palace, Engineer Coppetti expressed the opinion that solar energy, coal and gas are other sources that should be taken into account, although in the long run they would not yield as much energy as a 600 megawatt nuclear reactor.

Energy Outlook

"Uruguay currently has installed a capacity of 650 megawatts annually [as published]. As the number of consumers increases, the energy demand also increases. Annual growth varies. It can be around 4 percent, 5 percent or even more than 10 percent. Assuming an average growth rate of 6 percent annually, and with the hydrothermal power generating system fully operational by then, 1995 will see the start of a growing energy shortfall, which by the year 2000 will be of the order of 600 megawatts annually," the adviser said. In this regard, he explained that this amount of power is about half the total energy Salto Grande will be generating by 1995, at which time Uruguay will be receiving the maximum to which it is entitled under the binational agreement, that is, around 850 megawatts.

"For the time being, the engineer said, "we must continue depending on oil. The most our country can do is to maintain a reasonable supply of crude to cover the needs of its thermal plants. That plus putting into operation the Palmar dam. In this way, the availability of electrical energy will carry us to within another 15 years."

The Alternative: Nuclear Energy

"Uruguay must seek an alternative source to oil that it can bring into being within 10 years. That source is nuclear electric or nuclear power generation," said Engineer Coppetti, several of whose recommendations in this respect, included in a detailed report prepared in December 1978, have been incorporated in the National Atomic Energy Plan drawn up by our government last year.

"I speak of 10 years," he said, "because that is what it takes to train personnel, establish contacts with the international bodies that concern themselves with this field, and carry out the necessary technical and economic feasibility studies."

Asked about the dangers that could be involved in a malfunction of the proposed nuclear plant to be installed in our country, Engineer Coppetti borrowed from the words of J.C. Tattersall, general manager of the Atomic Energy Council's License Service of South Africa, who said: "By the very nature of the materials used in the building of reactors, a nuclear explosion is physically impossible. Such an event could never occur. The dangers to the public deriving from nuclear plants are probably at least 5,000 times less than those inherent in the use of automobiles, 50 times less than those attributable to lightning, and considerably less than those involved in exposure to solar radiations and those of the earth, to which we are all exposed."

Uranium in the Sea

"If in the near future Uruguay were to adopt a nuclear electric policy based on nuclear fission, the necessary fuel will be uranium, which has a tremendous energy potential," said the government adviser.

In this regard, he made an interesting revelation. "Uruguay has still not made use of its sea riches. It has already recognized one of them: fishing. But it still has not started exploiting another of them: uranium," he said.

"The concentration of uranium is practically constant in all seas of the world: 3 kilos per 1,000 cubic meters of water. Moreover, it is estimated that the total quantity of the mineral contained in sea water--some 2 million tons throughout the world--is 1,000 times greater than the total that exists in the earth's crust," he added.

Japan and England are already extracting uranium from the sea, he told us. He added some other interesting facts: One kilo of uranium, slightly enriched, produces the same energy as 40 tons of heavy fuel oil. The UTE [General Administration of State Electric Power and Telephones], to produce electricity, consumes 350 tons of fuel oil a year, which is the equivalent of 10 kilos of uranium.

In view of this, we asked, of course, what is the cost relationship. And here we were again surprised. "Fuel oil," said Coppetti, "costs $100 a ton and the cost of a kilo of uranium is also approximately $100."

But the sea contains another fuel as well, which will be exploitable shortly after the year 2000, once the technology of the fusion process will have been sufficiently mastered. That process uses deuterium (heavy hydrogen), of which the sea is a practically inexhaustible source. In this regard, the legislator told us that the fusion reaction has a duration of only some milliseconds and that the technology of the process has not yet been mastered sufficiently to exploit it.

Cooperation With Argentina

"A nuclear power reactor, that is, one of 600-megawatt capacity, which is the minimum it can have to be considered as such, and which is what our country would need, costs currently $2,000 [as published]. Uruguay is not in a position to undertake an investment of this magnitude. The alternative would be a binational undertaking with Argentina, a neighboring country that is well advanced in this field and which moreover has offered us its aid," said Engineer Coppetti.

"Argentina started working on nuclear electric energy 25 years ago and today has three plants (Atucha 1, Atucha 2, and Embalse Rio Tercero), one of which is now fully connected, and four others in the planning stage with the aid of the Federal Republic of Germany. To its experience must also be added the fact that it is a neighboring country and that transmission losses would be minor in the event of installation of a binational plant," he said.

As regards Brazil, our other neighbor, he recalled that it has two nuclear projects already in an advanced stage in Angra dos Reis, in the northern part of the country, and six others contracted for, also with the Federal Republic of Germany.

"In Uruguay," he said, "we have the Nuclear Research Center with a 1-kilowatt reactor having applications in medical and agricultural research, and it is planned to install a 1-megawatt reactor (1,000 times more capacity)."

Other Sources

With regard to solar energy, Engineer Coppetti thinks that, considering our geographical situation and our climate, it will not be exploitable other than for household use.

As for coal, he said it could be a solution, although Uruguay does not have its own deposits.

We spoke also of gas, a source that is about to be used by way of our agreement with Argentina for the installation of the gas pipeline.

Nevertheless, for our interlocutor, the real solution is one alone: nuclear energy.

"In any case," government adviser Engineer Coppetti concluded, "free ourselves of dependence on oil, world reserves of which will be exhausted in approximately 3 decades. And we must weigh the advisability of two alternatives: whether to administer them primarily as a source of fuel or of raw material for the petrochemical industry."

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CSO: 5100

INTERMINISTERIAL COMMITTEE SET UP TO DEFINE NUCLEAR ENERGY POLICY

Algiers EL MOUDJAHID in French 1 Nov 80 p 5

[Report by Ach. C.]

[Text] The Interministerial Committee on Nuclear Energy and Other Alternative Forms of Energy was installed Wednesday afternoon by Abdelhak Berarhi, member of the Central Committee and minister of higher education and scientific research, in the course of a meeting held at the CSTN [Center for Research on Nuclear Technologies].

In his introductory speech the minister, before defining the precise mission of this committee, found it necessary to place it in the general context in which the complex question of nuclear energy must fit. He first recalled that the Central Committee, during its second session, put the energy problem in terms of "preservation of our resources" over the long term. This indispensable preservation of our resources is still subordinate to our development.

The government, he added, has decided upon the creation of this committee, but that decision must be understood in its overall context. It thus cannot be dissociated from the work being done by the party's economic commission. The general orientation of an energy policy draws its inspiration both from the national constitution and from the political decisions emanating from the party.

Still within the framework of this reflection, the minister added, the question of nuclear energy is rather complex. A policy on the matter of nuclear energy has necessarily to take account of a number of parameters, including the national sovereignty and national defense, the link with our development, geopolitics, and the safety and protection of the population. In installing a nuclear power plant, he said, it is necessary to take several criteria into consideration. The national constitution will give us the broad orientation for working out an integrated method and long-term planning. The minister, by way of illustration, cited a certain number of questions relating to the development of nuclear research in this country.

The interministerial committee's mission will consist essentially in doing a basic study, in working out "a sort of memorandum" on the question of nuclear energy and alternative forms of energy. Aside from the fact that its tasks will include evaluating our uranium resources and other nuclear resources, it is entrusted with evolving a certain number of proposals: the technical choices, the training systems, and the production centers. It must also work out a nuclear foreign policy that takes account of our basic choices.

From a methodological point of view, sectoral groups have been constituted. These groups are seven in number. They have the following assignments:

1) Conservation of energy;
2) Nuclear raw materials;
3) Nuclear technology, research, and development;
4) Human resources and planning;
5) Broad outlines of international policy;
6) Radiation protection and regulation; and
7) Lastly, questions of technology, research, and development on solar energy, wind power, and geothermal power.

At the same time, at the organizational level, it has been decided to install a permanent secretariat of the committee, which would be entrusted essentially with maintaining the documentation concerning the field in question. The seven groups that have been set up will begin work this week. They will have a coordination meeting on 8 November.

Let us note, lastly, that this first meeting, which will include representatives of several ministries, will be steadily enlarged as the work of the seven separate groups advances.

5588
CSO: 5100

DEN UYL WANTS DEBATE ON NUCLEAR WASTE REPROCESSING POSTPONED

Rotterdam NRC HANDELSBLAD in Dutch 5 Nov 80 p 13

[Text] The Second Chamber's plenary debate on the approval of reprocessing contracts for Dutch nuclear waste with France and England will probably not be held this week. Yesterday opposition leader Den Uyl entered a motion for deferment.

Den Uyl does not agree that a number of Chamber members were only allowed to see the contracts after a written promise to the French company Cogema not to reveal any details.

Members of the Chamber cannot and may not extend such guarantees to private businesses. Den Uyl said yesterday in a short rules debate that only the government can be held responsible for data revealed by it or at its request.

According to the opposition leader Minister Van Aardenne is "fundamentally on the wrong track when it relegates responsibility to private entrepreneurs."

The French reprocessing company Cogema, which is to reprocess used fission rods of the nuclear power plant in Borssele, was only after sustained pressure prepared to let the members of the permanent Chamber committee for nuclear energy see the reprocessing contracts under oath of secrecy. The Chamber members were to promise in writing that they would neither copy or reveal any details. Moreover, they would only be allowed to see the documents under supervision of a civil servant of the Second Chamber.

Den Uyl called Minister Van Aardenne's proposal to let members of the Chamber enter in writing into obligations to third parties a dangerous precedent.

In his motion the opposition leader invites the government as yet to acquaint the Chamber in the usual manner with the contents of the reprocessing contracts which the government has at its disposal; he leaves it to the government whether that will be confidential or not.

Tomorrow Minister Van Aardenne will have to express his thoughts on the motion, but it is unlikely that the debate on international agreements resulting from reprocessing contracts can still continue this week.

10319
CSO: 5100

CDA, VVD DO NOT OPPOSE NUCLEAR WASTE PROCESSING

Rotterdam NRC HANDELSBLAD in Dutch 7 Nov 80 p 9

[Text] The government factions of the CDA [Christian Democratic Appeal] and VVD [Union of Freedom and Democracy], therefore a majority in the Second Chamber, are not against the nuclear waste processing contracts of the nuclear power plants of Borssele and Dodewaard. The contents of these contracts are a secret to outsiders; they regulate the return to The Netherlands by the reprocessing factories in France and England of radioactive waste of reprocessed fission rods from Borssele and Dodewaard.

The VVD and the CDA made these return shipments possible by concurring with the international agreements with France and England. The agreements assure these nations that The Netherlands will accept the nuclear waste of reprocessing.

Because the contents of the contracts were kept secret the Chamber debate on their contents was rather foggy. During a preliminary debate on procedures the factions of the government parties voted against attempts of the opposition to suspend the discussions because of the element of secrecy.

Nevertheless, the CDA and VVD insisted that Minister Van Aardenne (economic affairs) take steps to make the contracts public as yet (without conditions). The opposition has strong objections to the reprocessing contracts. D'66 [Democrats 1966] and the PPR [Political Party of Radicals] repudiated the contracts in the first round of the debate. The PvdA [Labor Party] faction appeared to be very hesitant but wants to defer its definite judgment until it has heard from the minister.

Except for fundamental objections against secrecy the opposition also objects to the fact that, by accepting the reprocessing contracts, the Chamber is forced to opt for the continuation of nuclear energy for a long time to come.

D'66 spokeswoman Mrs Lambers reproached the government for engaging into an "unacceptably heavy mortgage" on future policies. Zijlstra as spokesman of the PvdA objects to the fact that the contracts will have effects which go beyond the social discussions on nuclear energy.

According to Mrs Lambers proponents of reprocessing pursue an "ostrich policy" for the waste problems of the future. Zijlstra believes that the waste problem is badly underestimated. The unacceptability of the waste problem was for PPR spokesman Jansen a reason to introduce a motion to close the Borssele and Dodewaard plants.

Spokesman for the CDA and VVD appeared to support the contracts because without parliamentary approval the reprocessing contracts would have to be canceled and this would ultimately force the government to close the nuclear power plants of Borssele and Dodewaard. Both the CDA and the VVD want to keep the existing plants in operation, even if it would be only temporary.

CDA spokesman Van Houwelingen denied that concurrence with the agreements would, as far as his faction is concerned, also mean what he terms "actual reprocessing." He asked the government to impose conditions as regards the use of plutonium which will be generated during reprocessing.

VVD spokesman Braams emphasized that if reprocessing of the used reactor rods of the power plants is rejected there will be no solution for storage near the plants. According to him it would be indefensible to refuse the reprocessing of nuclear waste if it is responsible packed.

10319
CSO: 5100

NUCLEAR WASTE STORAGE FACILITY MAY BE BUILT IN BORSSELE

Rotterdam NRC HANDELSBLAD in Dutch 5 Nov 80 p 13

[Text] Yesterday the municipal council of Borssele in Zeeland gave the green light to the construction of a storage building for low and median radio-active waste near the Borssele nuclear power plant. The council agreed to a change in the plans it had for the area on which the nuclear plant is located. Only the PvdA [Labor Party] and PPR [Political Party of Radicals] factions voted against the plan.

The municipal council emphatically demanded that the storage building be exclusively used for waste from the nuclear power plant itself.

The council adopted a PvdA motion which objects to the construction of a second nuclear power plant in Borssele. In part III of the Memorandum on Energy Policies the government mentioned Borssele as future location. The council adopted also a CDA motion which urges that (broad) social energy discussions be started as soon as possible. Borssele finds it unacceptable that the opening of this discussion was recently deferred again to the beginning of next year.

Mayor G. van den Jeuvel announced that Borssele will open the discussion itself if the government does not take a decision very soon.

10319
CSO: 5100

BRIEFS

FORSMARK 1 TO START--Forsmark 1, Sweden's 7th nuclear reactor, is to begin commercial operation before Christmas. The reactor will produce 5 TWh (billion kilowatt hours) of electricity a year, and will therefore be the largest reactor so far to start operation. Bringing of Forsmark 1 on line has gone better than planned, according to the Electric Power Authority [Vattenfalls]. The commercial operation is therefore starting a few weeks earlier than planned. Electricity production from Forsmark 1 corresponds to the electricity consumption of about 150,000 electrically warmed houses. Forsmark 2 is estimated to be in commercial operation in August 1981. Altogether both of the Forsmark units will produce about 11 TWh every year. Sweden's total electricity consumption is about 95 TWh a year. [Text] [Stockholm DAGENS NYHETER in Swedish 11 Dec 80 p 41]

CSO: 5100 END

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16 January 1981

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 77

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16 January 1981

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 77

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HOUSE HEARS OF PROBLEMS WITH U.S. URANIUM

Calcutta THE STATESMAN in English 27 Nov 80 p 12

[Text] New Delhi, Nov. 26.--The Lok Sabha was told today that an overdue second consignment of 19.8 tonnes of enriched uranium, which should have arrived between March 1979 and September 1980 for the Tarapur atomic power plant, had been "withheld" by the U.S. Government and made "subject to conditions extraneous to the cooperation agreement of 1963".

This was stated by the Prime Minister in a written reply to a question by five members, including Mr Madhu Dandavate, on the U.S. uranium supply. She told them that one of the two consignments due during that period and "for which we had applied in September 1978", was received in India in the first week of October this year. The second had been withheld. However, another application for 19.8 tonnes of enriched uranium had been made on September 24 for delivery between March and September 1981. (This was in accordance with the agreed schedule of deliveries, she said in a written reply to another question.)

The Government of India, she told the questioners, "will be prepared for any eventuality by using alternative measures to ensure the continued operation of the Tarapur plant without depending on outside sources". One of the alternatives would be to operate the Tarapur reactors on indigenously fabricated mixed oxide fuel. Investigations in that regard are in progress.

Asked how long the present stock of nuclear fuel at Tarapur would last, Mrs Gandhi answered: "with the present stocks of fresh fuel, the Tarapur reactors can operate till 1983-84". Replying to another question, she said (in a written reply, again): "no consignment of enriched uranium for use as fuel at the Tarapur station has been received on a timely basis since 1975".

Answering yet another question, she said that in terms of the cooperation agreement of 1963, the Tarapur reactors could be operated on no other fuel than that supplied by the U.S. Government. "The Government of India is in touch with the Government of the United States for the continued supply of enriched uranium on a timely basis for the entire duration of the agreement of 1963 and in strict accordance with its provisions".

One question today dealt with the apprehension of some experts that the Narora atomic power project is a potential threat to the safety of the entire Indo-Gangetic plain. Mrs Gandhi told the questioner that the Government was aware of Press reports to that effect and felt that the concern was entirely misplaced. She added: "Even at the time of selection of a site, the Government was aware of the fact that it lies in a seismic region. The station has been designed incorporating adequate satety measures. There is no need for any concern with regard to the safety of the environment or of the Indo-Gangetic plain".

Two other points made by Mrs Gandhi in written answers today: The site selection committee appointed by the Government had recommended certain sites in the western region, which includes Gujarat State, for the establishment of an atomic power station. The recommendations were under consideration of the Government and a final decision would be taken soon. "However, no definite time limit can be indicated".

The No. 1 unit of the Kota atomic power station was operating satisfactorily at present and continuous efforts were being made to further improve its performance. "Short term as well as long term remedial measures are being implemented as and when necessary to prevent recurrence of the problems".

The Prime Minister noted that of the 227 days in 1977 when the Kota station remained closed, plant maintenance accounted for 45 days, grid problems, equipment failure and human errors for 45 days, and labour unrest and strikes for 137 days. In 1978 the days lost amounted to 301, because of all three reasons. In the past year and in the first 10 months of the current year, however, only 64 days and 89 days had been lost. The reasons: "grid problems, equipment failure and human errors".

CSO: 5100

BRIEFS

POSITION AGAINST WEAPONS RESTATED--Mrs Gandhi has reiterated that India neither possesses any nuclear arms, nor has it any intention of producing them. She said that our stand is for complete elimination of nuclear weapons. In a reply to a letter she received from one of the victims of Hiroshima in Japan, (Tetsu Kitagawa), she said India's nuclear energy program is entirely meant for peaceful purposes. [Text] [BK310732 Delhi Domestic Service in English 0240 GMT 31 Dec 80]

ATOMIC ENERGY APPOINTMENTS--It has been officially announced in New Delhi that Dr Raja Ramanna will be the director of the Bhabha Atomic Research Center. He will have the rank of a secretary to the government of India. Dr H.N. Sethna, secretary in the department of atomic energy will be the principal secretary in that department. [Text] [BK291552 Delhi Domestic Service in English 1530 GMT 29 Dec 80]

CSO: 5100

INDONESIA

BRIEFS

NUCLEAR COOPERATION WITH ITALY--The BATAN (National Atomic Energy Agency) and CNPEN (Italian National Energy Committee) have signed a first stage (first arrangement) agreement to work together in the area of nuclear energy uses for peaceful purposes. Professor A. Baiquni, director general of BATAN and Professor Umberto Colombo, president of CNPEN, signed the agreement on Thursday at the BATAN headquarters in Jakarta. This first stage includes the exchange of experts and technology in the field of nuclear safety, firing elements technology, isotopes in agriculture, laser and its uses, along with reactor engineering experiments. This agreement represents the execution of the cooperation plan for the peaceful purpose of nuclear energy uses that was signed last March 17th, 1980 by the Indonesian and Italian governments. Professor Colombo, leader of the 8 member delegation from CNPEN, arrived in Jakarta on Wednesday. They left Indonesia on Saturday after visiting the atomic reactor Kartini in Yogyakarta on Friday. During Professor Colombo's stay in Jakarta he met with Soemarlin, Minister of State Aparatus Regulations, Soebroto, Minister of Energy and Mining, B.J. Habibie, Minister of Research and Technology, and Professor A. Baiquni, Director General of The National Atomic Energy Agency. [Text] [Jakarta PELITA in Indonesian 10 Oct 80 p 1] 9556

CSO: 5100

RUSES EMPLOYED TO OBTAIN NUCLEAR MATERIALS

Kuala Lumpur BUSINESS TIMES in English 1 Dec 80 p 6

[Article by Simon Henderson]

[Text] THE HEAD of the United Nations watchdog on nuclear materials — the International Atomic Energy Agency — has suggested that a nuclear bomb should be exploded to remind the world what a horrible weapon it is. This week (starting Monday September 8) he is sending an investigator to Pakistan to check that General Zia-ul Haq's regime does not embarrass the nuclear powers by doing it first.

The inspection of the Canadian-built power reactor in Karachi is part of the regular series which Pakistan committed itself to when buying the reactor which started operation in 1974. But the visit is given added significance by the news a week ago that Pakistan has succeeded in making its own uranium fuel rods — a notable step in nuclear independence and on which, if misused, could give Pakistan the very material suitable for a bomb.

In terms of the IAEA's safeguards, Pakistan has never done anything wrong. The Agency regards all information about its relations with countries with nuclear reactors as confidential, but it is prepared to say it has always been satisfied with what it has seen, either in Karachi or at the smaller research reactor near the capital, Islamabad.

The world's nuclear powers remain acutely worried that Pakistan is seeking to acquire a nuclear weapon. Aware of the awesome nature of their own weapons they do not relish the prospect of the capability spreading. The safety net is the safeguard system of the IAEA which is designed to allow access to nuclear technology for peaceful purposes while preventing diversion of material for military use.

But it is a safety net which seems at times almost like breaking.

For the past three years it has been known that Pakistan has been secretly trying to purchase abroad the components to make a plant at Kahuta, near Islamabad, to produce highly enriched uranium — that is uranium 90 per cent plus in the strength of its fissile isotope uranium-235.

The significance of its new fuel rods is that if misused they might provide a source of another fissile substance — plutonium. It was this very fear that caused Canada to stop supplying its own fuel rods in 1976 and later cancel the sale to Pakistan of a fuel fabrication plant. Now Pakistan has done it by itself anyway at Chashma, on the Indus. One more foreign constraint on the country's presumed ambitions has gone.

Western officials say that theoretically the country should have never been able to buy the equipment for the new fuel plant. Such a plant is on the "stop-list" of the Nuclear Suppliers Group, the cartel of nuclear powers which tries to limit the spread of potentially dangerous technology.

But it is not difficult to circumvent the restrictions. Such components as the zirconium cladding for the uranium fuel are allowed to be exported, provided they are not in greater quantities than 500kg per year. And Pakistan has acquired a wealth of experience in surreptitious purchasing campaigns abroad if it wanted to go beyond this.

On the enrichment programme alone Pakistan is estimated to have spent several hundred million dollars buying components (or the machinery to make them) for a plant, similar to that in Holland from which a Pakistani scientist allegedly stole the plans in the early 1970s.

The components for the fuel fabrication plant are believed by Western countries to have been bought in France. The actual process is not clear but Pakistan is known to have special nuclear purchasing experts secretly assigned to its embassies in Paris, Brussels and Bonn.

Transporting to Pakistan would not have been much of a problem either. In the past material has been flown direct to Pakistan just by booking it airfreight on Pakistan International Airlines. According to the country the goods are purchased in, Western officials say it has sometimes been necessary to be slightly more discreet on how items are sent. In those cases they have been sent to a Pakistani-owned trading company in Dubai which has provided a suitable cut-out for the end-user certificate. Because of the often innocuous nature of individual parts, the West has been very unsuccessful in anything more than slowing the purchases.

A similar ruse was played when Pakistan wanted to buy unprocessed uranium. Purchased from Moslem Niger in West Africa, it went by truck across the border to Libya and then onward to Pakistan. Normal requirements for reporting of uranium sales to the IAEA were largely ignored. As it is, Pakistan is now mining its own uranium anyway. Deposits near Multan — ironically, originally explored under the United Nations Development Programme — are being used in the new fuel rods.

The IAEA inspector will be looking to see how these new rods are working and at the same time checking that the original Canadian rods are still being stored properly. It is no more than a routine visit, one of an estimated two or three a year, but it is vitally important that everything should be found in proper order.

In fact Indian writers now openly describe Pakistan's efforts to make a bomb as a race between this plutonium route and the enrichment route.

Obviously fearful of the repercussions in the region's balance of power from such a development, one new Indian book, "Nuclear Pakistan", takes a delight in naming the scientists whom it sees as separately backing each route.

The division is confirmed by Western diplomats who say that the competition is so fierce that sometimes the two projects have had very little to do with each other.

But one Western official, contacted last week in Geneva where he is attending the review conference of the Nuclear Non-Proliferation Treaty, said despite the building of a fuel fabrication plant, the enrichment route will probably be the first to provide Pakistan with a bomb. — FT

CSO: 5100

BRIEFS

NUCLEAR CENTER--Lahore, Dec 17: The Punjab Government in collaboration with Pakistan Atomic Energy Commission will establish nuclear centre within the Sheikh Zaid Hospital Campus, Lahore, within next two years. According to a handout the whole project will be completed at a cost of Rs 21.8 million, including Rs 70 lakh for the construction of buildings.--APP [Text] [Karachi DAWN in English 18 Dec 80 p 6]

CSO: 5100

BRIEFS

URUGUAY-BRAZIL ENERGY MEETING--The most important matter to be taken up between Minister of Mining and Energy of Brazil Cesar Cals and Minister of Industry and Commerce of Uruguay Francisco Tourreilles, this Monday and Tuesday, in the city of Santana do Livramento, at the border between the two countries, involved a nuclear technology agreement. According to Ministry of Mining and Energy sources, Uruguayan Minister Tourreilles, in his letter of invitation which he sent to his colleague Cesar Cals, noted that his country "is very much interested" in learning Brazilian technology in the nuclear sector. In addition to a possible agreement in this sector, there are two other matters on the agenda: (1) supply of electric energy by Brazil to Uruguay to guarantee supplies after the year 2000, when the resources of Salto Grande and Palma will have run out; (2) coal technology. [Text] [Rio de Janeiro GAZETA MERCANTIL in Portuguese 22-24 Nov 80 p 8] 5058

CSO: 5100

TRANSSHIPMENT OF SOUTH AFRICAN BOMB MATERIAL ALLEGED

Sao Paulo FOLHA DE SAO PAULO in Portuguese 15 Nov 80 p 6

[Text] Brasilia--The suspicion that Paraguay reexported through Brazil arms that allegedly had been used in the detonation of the first South African atomic bomb led Senator Itamar Franco (Brazilian Democratic Movement Party--Minas Gerais), concerned about the seriousness of the charge, to demand a full clarification from the majority bloc in order to "relay to the nation all matters connected with that alarming fact."

According to Itamar, the Foreign Ministry's story that the Brazilian Government does not know anything about the matter because Paraguayan goods are shipped in Paranagua in sealed crates did not convince anyone. On the basis of legislation pertaining to the entrepot agreement between Brazil and that country, he sought to show that the Brazilian port authority is obliged to inspect goods in terms of content, label, weight and other details.

After pointing out that the Brazilian foreign policy position rejects the proliferation of atomic weapons, he called attention to the consequences which the action could bring about in our policy with the African nations inasmuch as South Africa is constantly being condemned by UN resolutions.

"So I ask: what sort of reprisal are we exposing ourselves to by those who justifiably oppose the perverse racist policy?"

Investigation

Even granting that Brazil knew absolutely nothing about the matter, Itamar stressed that it was to be hoped that the government would initiate an immediate investigation to clarify the suspicion. In the event that it were confirmed that Paraguay had engaged in fraud, he believes the goods entrepot agreement with that country through Paranagua should be denounced.

In the name of the majority, vice leader Aloisio Chaves (Para) pledged that he will seek to get the necessary clarifications and make them known to the chamber. However, he stressed that the Paraguayan authorities might not be implicated since the private transporter could use a fraudulant expedient to reexport weapons through Brazil. Responding, Lazaro Barbosa (Brazilian Democratic Movement Party--Goiaz) maintained that even so the Paraguayan Government had to assume responsibility inasmuch as the international agreement is an act of sovereignty.

Three-Way Operation

In his statement, majority vice leader Jose Lins (Ceara) observed that both the Brazilian and Paraguayan governments can be tricked, pointing out that, in the case of fraud, someone in authority in Paraguay should be held accountable for the improper use of the agreement instrument. Paulo Brossard (Brazilian Democratic Movement Party--Rio Grande do Sul), not satisfied with Lins' explanation reserved comment awaiting the official explanations.

Itamar stressed that, according to the press, the arms traffic for the South African atomic bomb had been the result of a three-way operation because the German company that was the supplier of the material--155 mm howitzers--could not sent it directly because of UN embargoes against that African country because of its apartheid policy. Using the facilities granted by Brazil to Paraguay for international trade, the latter reportedly acted as a reexporter.

8711
CSO: 5100

NUCLEBRAS REPORTS ON ANGRA PROJECT

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 12 Nov 80 p 26

[Text] Brasilia--The president of the Brazilian Nuclear Corporation (NUCLEBRAS), Paulo Nogueira Batista, revealed in the national congress yesterday that by March 1981, all the piles planned to be driven in the Angra-II complex (a total of 1,363) will be in place and that that operation alone will cost $5 million. So far, 1,269 piles have been driven. Paulo Nogueira did not indicate what the total cost of the delay in the project timetable will be, stressing that that is a matter that pertains exclusively to Furnas. The important thing, in his opinion, is that the errors have been corrected.

In another part of his testimony before the nuclear congressional investigating committee, Paulo Nogueira Batista said that the opponents of the Brazilian nuclear program "seek to undermine its economic foundations in order to create doubts abroad about the peaceful intentions of national policy in that sector, or doubts regarding the determination of the government and its ability to show what it is capable of in that area." In his opinion, nothing will deter the official course in its determination to obtain technology in that area for exclusively peaceful purposes.

After stressing that Brazil did not subscribe to the treaty on the nonproliferation of nuclear energy [as published] because it considered it discriminatory, the president of NUCLEBRAS again criticized that treaty, saying that it is nothing more than a measure to restrict access to nuclear energy. In his opinion, that treaty is "inadequate to promote the objective of nonproliferation of nuclear weapons, either in the vertical sense of nuclear disarmament properly speaking or in the horizontal sense of not increasing the number of countries possessing those weapons."

Reviewing the first contacts by Brazil with a view to establishing its nuclear program recently, Paulo Nogueira Batista revealed that the need for a nuclear-electric program, emphasized by the Brazilian Electric Power Company (ELETROBRAS) as a result of the progressive exhaustion of the hydroelectric potential in the Southeast region, "made it inevitable that we consider seeking international cooperation." And in accordance with broader objectives, the government could not restrict itself to permitting electric power service concessionaires to purchase "plants abroad recommended by ELETROBRAS, as a 'black-box' package."

That "basic guideline," he added, immediately eliminated direct negotiations with U.S. companies, "the traditional suppliers of the electric sector and Angra-I." The NUCLEBRAS president revealed that contacts established with the United States, "even at the government level, immediately showed the impossibility of broad cooperation within the terms desired by Brazil, particularly with regard to the areas of the isotopic enrichment of uranium and the reprocessing of irradiated materials."

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CSO: 5100

BATISTA VIEWS ANGRA-II STATUS, PROGRAM COST, NPT

Rio de Janeiro O GLOBO in Portuguese 12 Nov 80 p 21

[Text] Brasilia--The cost of the Brazilian nuclear program, which is supposed to generate 10,000 megawatts by 1995, is estimated at $13.5 billion at current prices. The president of the Brazilian Nuclear Corporation (NUCLEBRAS), Paulo Nogueira Batista, testifying before the senate committee investigating the Brazilian-German nuclear agreement, revealed yesterday that investments will amount to $7 billion by 1990.

Paulo Nogueira Batista, the last to testify before the senate investigating committee, whose conclusions will be known early next year, directly rejected all the criticism being leveled at the Brazilian nuclear program, pointing out that the investments in the program envisaged for 1981 represent only 1 percent of the overall expenditures of state companies. NUCLEBRAS' foreign debt does not amount to 1 percent of Brazil's indebtedness.

"What the opponents of the Brazilian program seek is to undermine the economic foundations of the program to create doubts abroad about the peaceful intentions of our nuclear policy or doubts regarding our determination and our capability to carry it out."

Nogueira said that in stressing that Brazil has 213,000 megawatts of hydroelectric energy at the present time, the critics of the program forget that that potential is in the Amazon region and, therefore, does not represent an increase of available supplies for utilization in the short term. In the Southeast region, which represents 70 percent of national electricity consumption, he added, the available potential will be exhausted before the end of this decade, according to the predictions of the Brazilian Electric Power Company (ELETROBRAS).

Even if all of Brazil's hydroelectric potential were utilized, it would be exhausted by the year 2003 due to the growth of consumption, estimated by ELETROBRAS at 10 percent per year in the current decade and 7.5 percent the following decade, the NUCLEBRAS president observed, concluding that "the proposal to abandon or slow down the nuclear program does not make sense."

Replying to questions of senators from the Social Democratic Party (PDS) (the opposition members left the committee in protest against the fact that aides of the minister of mines and energy had not been summoned), Paulo Nogueira Batista said that in supporting the "slowing down" of the program, Vice President Aureliano

Chaves "had only expressed a personal opinion which does not reflect the thinking of the government, as he himself emphasized."

He argued also that within the next 10 years, the nuclear power plant program will represent less than 15 percent of the overall investments envisaged for the generation and transmission of electricity, "which clearly show the real priority ascribed by the government to the hydroelectric sector."

According to Paulo Nogueira Batista, the critics of the program also forget the fact that there are hydroelectric plants the cost per installed kilowatt of which is already even higher than that envisaged for the nuclear plants. Citing the Balbina plant in the Amazon region as an example of that, he stressed that in general nuclear plants can already be competitive with the hydroelectric plants that will go into operation in the early nineties.

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CSO: 5100

OPPOSITION REJECTS NUCLEAR ACCORD WITH ARGENTINA

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 20 Nov 80 p 30

[Text] Brasilia--By 9 votes to 6, the representatives of the opposition in the Mines and Energy Committee of the Chamber of Deputies yesterday rejected the nuclear agreement signed between Brazil and Argentina. The opposition deputies followed the separate opposing vote of Deputy Marcelo Cordeiro (Brazilian Democratic Movement Party--Bahia), who had asked for an opinion on the report by Deputy Joao Faustino (Social Democratic Party--Ceara), favoring the accord.

Cordeiro said that his vote was political, designed to alert the country "against a badly dimensioned nuclear policy lacking legitimacy, which is only conferred by democratic methods." In his opinion, it is the task of the congress to generate "a new, open" discussion of the strategy of the agreement.

The congressman declared that the country must master nuclear technology but he does not believe that the Brazilian nuclear program is the best solution for the country's energy problem. Cordeiro believes that Brazil's dependence in the nuclear area is "beginning to show the first signs of a split" inasmuch as, he explained, the transfer of technology from Germany makes the country ever more dependent.

In his opinion, Brazil signed the agreement with Argentina because of "a badly dimensioned nuclear program beyond our real possibilities." In Cordeiro's opinion, the agreement with Argentina "fits into the complicated nuclear fuel cycle and our position in relation to Argentina places us at great disadvantage" because Brazil needs uranium from Argentina to have as a fuel reserve.

Marcelo Cordeiro pointed out that plant No 1 at Angra dos Reis is going to shut down for 3 months to change one-third of its fuel and if the Brazilian Nuclear Corporation (NUCLEBRAS) uranium concentrate plant in Pocos de Caldas does not provide a sufficient amount to recharge the plant, Brazil would have a supply guarantee from Argentina. According to the agreement signed, that country is supposed to supply Brazil with 240 tons of uranium concentrate.

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CSO: 5100

NO DECISION REACHED ON REMOVAL OF NUCLEAR WASTE

Sao Paulo FOLHA DE SAO PAULO in Portuguese 2 Nov 80 p 28

[Text] Itu--The National Nuclear Energy Commission (CNEN) has no prediction as to when the material stored in the Batuxim district of Itu will be removed from there and sent to the nuclear reactors that are being installed in Brazil. That information was conveyed last week at a meeting held in the Itu city hall with the participation of community leaders and the director of the Department of Nuclear Installations and Materials, Jose Julio Rozental, who visited the municipality to reassert the point of view of the CNEN, that the material sent there "does not represent any danger to the Itu community."

The problem was fully analyzed for more than 2 hours. During the meeting, Rozental heard many appeals that the material stored in Itu be removed and transferred to another site. But the CNEN representative made it clear that that decision does not fall into his area of decision. He even contradicted one of the councilmen present, who insisted on pointing out the dangers of the storage site, declaring that he was prepared "to drink the water found there, in your presence" to prove that the wide publicity given to the existence of the atomic waste "was sensationalism."

"The material in the Itu storage site can be considered basic material within the context of the nuclear program inasmuch as it contains a very significant uranium reserve and there is no atomic waste of any kind." Rozental pointed out that in order for a reactor to operate, it needs uranium, stressing the existence of a fuel element factory to prepare it. After commenting on the uranium conversion phase, the CNEN representative justified the construction of the Rezende industrial complex with three factories that will take care of the conversion, enrichment and manufacture of the fuel element. "The latter is what will go into the reactors to generate electric energy."

Showing photographs of material storage sites in other countries, Rozental sought to prove that there is no danger, not only to the community but also to those who work in the area. "Anyone having a chest X-ray receives as much radiation as if he were to remain 2 hours near the drums at the Botuxim storage area."

Recounting the Brazilian nuclear process, he stressed that there is no technological development that does not produce "something that you and the people call waste and that does not generate pollution. The capital problem is that: there cannot be well-being of any of the population, there cannot be calm and consequently progress, if there is not a positive net balance. And that is one of the principles of nuclear safety."

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CSO: 5100

BRIEFS

NUCON CONSTRUCTION SUBSIDIARY--The Nuclear Construction Company (NUCON), the new subsidiary of the Brazilian Nuclear Corporation (NUCLEBRAS), created by presidential decree, will be responsible for all plant construction in Sao Paulo with the technical support of the Sao Paulo Electric Power Company (CESP). There has not been any indication yet as to who will comprise its management. CESP directors denied yesterday that its vice president, Jose Gelazio da Rocha, a nuclear energy specialist, has been asked to assume the directorship. However, the report has been confirmed that NUCON will work in Sao Paulo in coordination with the CESP on the construction of two nuclear plants which, together with Angra-II and -III under construction in Rio de Janeiro, will make up the four plants envisioned in the nuclear agreement with Germany, which can be expanded, if the government so desires, with the construction of four more units. Another report that was confirmed is that NUCLEBRAS will sign a contract with Cobrama for supplying the heat exchangers for Angra-II. [Rio de Janeiro JORNAL DO BRASIL in Portuguese 3 Nov 80 p 28] 8711

ENERGY PROGRAM INCENTIVE--Brasilia--Beginning this week, Planning Minister Delfim Netto will resume a series of contacts with groups of businessmen--at least 6 groups of 15 persons each have already been selected--to whom he will say: whoever wants to earn money in 1981 will have to engage in some project of the Energy Mobilization Program or encourage some activity connected with agriculture and exports. Delfim will say that all investments or the overwhelming majority of them must be concentrated in those three segments of the economy. In 1981, at least $10 billion, or 600 billion cruzeiros at today's prices, will be invested in the energy sector alone; that is equivalent to 5 percent of the gross national product. [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 16 Nov 80 p 52] 8711

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CNEA CELEBRATES 25TH ANNIVERSARY

Montevideo LA MANANA in Spanish 5 Dec 80 p 9

> [Text] The National Atomic Energy Commission, created by the Decree of 30 November 1955, has been engaged in specific activities connected with the celebration of its silver anniversary in this interesting scientific discipline.

At that time, the Executive Branch gave the University Commission federal status and designated it as the National Atomic Energy Commission in view of the need for sponsoring and promoting, by all means, the study and drafting of suitable programs and plans for the peaceful uses of atomic energy.

Stages Completed

Our fellow scientists have gone through arduous stages and many times had to grapple with serious economic and other problems as well as the lack of understanding on the part of those who did not know or did not wish to understand the tremendous significance of the peaceful use of atomic energy in the life of nations.

At the start of its activities, a team of experts from the USAEC and the United States State Department arrived in the country, among other things talking about President Eisenhower's "Atoms for Peace" plan and suggesting the signing of an agreement for the peaceful use of nuclear energy with the United States. The agreement offered financial assistance (up to $350,000) as well as technical assistance in setting up a research and training reactor, plus up to six kilograms of enriched uranium for that reactor. The bill remained in parliament for several years and the agreement was not ratified in the end.

Atoms in Action

The "Atoms in Action" exhibit was organized in Montevideo in 1966, for the first time showing the public the Lockheed reactor which later on, in 1965, was purchased by the country and once again placed in operation in 1978.

The implementation of the food irradiation program--particularly involving potatoes --was begun in 1969. The 1970 Budget Law allocated funds for a feasibility study involving the establishment of a food preservation plant using irradiation; in June 1970, the Montevideo city manager's office authorized the sale and consumption of irradiated potatoes.

Current Events

The current period was started with a transfer of the CNEA [National Atomic Energy Commission] from the Ministry of Education and Culture to the Ministry of Energy and Industry in 1974. The makeup of the CNEA was profoundly altered in 1976, with its members being reduced from 21 down to five. Efforts were stepped up throughout the country in the area of uranium prospecting and that culminated in the work connected with the construction of the R-1 reactor in 1978, the year it also became critical.

In terms of international relations, a cooperation agreement was signed with Chile, followed by the signing of the Cooperation Action Plan with Argentina and a visit by distinguished personalities among whom we must single out the director-general of the IAEA, Dr Sigvard Eklund, the chairman of the Argentine CNEA, RAdm Carlos Castro Madero, and the chairman of the JEN, Lt Gen Jesus Olivares.

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EGYPT

BRIEFS

NUCLEAR REACTORS FROM U.S.--Deputy Prime Minister and Foreign Minister Kamal Hasan 'Ali has stated that the Arab Republic of Egypt has initialed with the United States agreements for the establishment of nuclear power stations. Negotiations have also been held for this purpose with France, Canada, Britain and Australia. In a statement to our reporter, Kamal Hasan 'Ali said that Egypt's ratification of the treaty on the nonproliferation of nuclear weapons is a condition for supplying Egypt with nuclear power stations. He added that the Cabinet recently approved this treaty, which will be submitted to the Parliamentary Committee of the National Democratic Party prior to its submission to the People's Assembly for ratification. Kamal Hasan 'Ali said that from now until the year 2000 Egypt will need about 10 nuclear power stations for its projects. [Text] [NC251903 Cairo Domestic Service in Arabic 1830 GMT 25 Dec 80]

NUCLEAR NONPROLIFERATION AGREEMENT--Cairo, 24 Dec (MENA)--During its meeting today under the chairmanship of Dr Fu'ad Muhyi ad-Din, the Cabinet condemned Libya's intervention in Chad. The Cabinet's secretary general, Counselor 'Adil 'Abd al-Baqi, said after the 6-hour meeting that Deputy Prime Minister and Foreign Minister Kamal Hasan 'Ali reviewed foreign affairs in general, dwelling in particular on Egypt's position on the Chadian issue and its condemnation of Libya's intervention. 'Abd al-Baqi added that the Cabinet agreed to proceed with steps to ratify the agreement on the nonproliferation of nuclear weapons signed by Egypt in 1968. Kamal Hasan 'Ali earlier explained that it was in Egypt's interest to ratify the agreement because it would confirm its peaceful couse and good intentions as well as enable those countries with nuclear expertise to cooperate with Egypt in constructing nuclear powerplants. [Excerpts] [NC241614 Cairo MENA in Arabic 1522 GMT 24 Dec 80]

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SOVIET COMMENT ON ISRAELI NUCLEAR WEAPONS DEVELOPMENT

Moscow KOMMUNIST VOORUZHENNYKH SIL in Russian No 20, Oct 80 signed to press 3 Oct 80 pp 81-86

[Article by N. Pokormyak: "Dangerous Tool of Imperialism and Zionism"]

[Excerpt] Israel's development of military industry includes a nuclear weapons program being carried out with U.S. blessings. Development of nuclear weapons has been underway for many years at the Dimona scientific research center. And it is no coincidence that Israeli leaders have repeatedly threatened to employ "nonclassic" weapons against the Arab countries. In these nuclear preparations, Tel Aviv cooperates actively with the YuAR [Republic of South Africa]. According to a report by a special UN committee against apartheid, Israel is directly associated with the military aspects of South Africa's nuclear program and is taking a direct part in building nuclear installations in the Republic of South Africa.

The Arab nations and the world's entire progressive public are justly disturbed and concerned about Tel Aviv's nuclear ambitions. The question arises: Where does Israel, whose Zionist rulers proved unable to establish the developing and self-serving state on their own, get all the enormous means to maintain an army large in relation to the country's size, to supply it with modern weapons, and to conduct aggressive actions against the Arab nations? One should look for the answer in the "special relationship" that exists between Israel and the United States. Washington makes use of this state as a springboard for gross interference in the affairs of the Near and Middle Eastern nations and for carrying out its hegemonic aspirations in this region. From 1948 through 1979, the United States has granted Tel Aviv 15.5 billion dollars just through the policy of government subsidies. To this should be added the generous "donations" to Israel from the international Zionist organizations.

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SOVIET VIEWS ON SOUTH AFRICA'S NUCLEAR CAPABILITY

Moscow SOVETSKIY VOIN in Russian No 4, Feb 80 pp 46-47

[Article by Col F. Penkin: "The Racists' Nuclear Ambitions"]

> [Text] Angrily assailing the NATO countries' criminal military cooperation with the Pretorian racists spearheaded against the national liberation movement in southern Africa, readers of the journal of Sergeants V. Zakharov and S. Rakhimov, Pfc S. Shakura and Pvt V. Kozlov request a more detailed description of how, in violation of many UN decision, the Western powers have helped the apartheid regime create the foundations of a nuclear industry in the Republic of South Africa and develop nuclear weapons. We publish the following article on this subject.

It has long been no secret that practically every leading Western power and their numerous transnational companies doing business in southern Africa have contributed to the creation and development of South Africa's nuclear industry. Only thanks to the comprehensive support of the leading countries of the aggressive NATO bloc and also Zionist Israel has the apartheid regime in Pretoria been able to get right to the point of the creation of nuclear weapons, which it has long dreamed of getting its hands on.

In the evening of 26 October 1979 the U.S. State Department issued a statement which officially reported: "The U.S. Government has information which allows us to believe that a low-yield nuclear explosion occurred on 22 September in an area of the Indian and the southern Atlantic oceans which also covers certain parts of Antarctica and southern Africa." At the same time officials specified that the nuclear explosion had occurred close to the shores of South Africa.

Attempting to ward off the wave of anger and endeavoring to confuse the world public, the South African information media circulated a fraudulent version to the effect that there had been no test but merely that there had been "an accident on board a Soviet nuclear submarine." Such fabrications were, naturally, utterly groundless, and TASS repudiated these fabrications as to their worth in its statement.

Officials of a number of Western countries which are NATO ringleaders hastened to dissociate themselves from participation in this event--development of a nuclear device and its presumed explosion. Thus D. McHenry, American UN representative, stated that the United States "bears no responsibility" for what had occurred. He attempted to explain this by the fact that his country had allegedly "ceased all cooperation with South Africa in the sphere of nuclear energy 2 years ago."

Of course, this interpretation of the fact is unconvincing and was dictated more by an attempt to confuse the international community, primarily the African countries, and deflect from the United States blame for Pretoria's criminal involvement in the nuclear race, for which South Africa is persistently and consistently creating its own nuclear potential.

Much documentary evidence has been accumulated of the West's direct participation in the encouragement of South Africa's nuclear ambitions. Thus addressing a session of the UN Security Council Committee for Monitoring Observance of the Embargo on Arms Supplies to South Africa, the American scientist Ronald Walters stated that the United States, West Germany, Britain, France and Israel had played the main part in creating the racists' military and nuclear potential. [Rouks], former chairman of South Africa's Atomic Energy Administration, frankly confirms:

"If we are now at such a high stage in nuclear research, this should be attributed to the assistance which the United States so readily afforded us in the first years of our nuclear program; several nuclear powers of the Western world through joint efforts initiated our scientists and engineers into the secrets of the core."

Why are the NATO countries and the imperialist monopolies acting as the solicitous guardians of the racists and giving them all-around assistance, in the nuclear sphere also? There are several reasons here: very high profits, which are sometimes of the order of 40-45 percent, serve as a kind of strong magnet which has long attracted foreign monopolies and their capital to South Africa; South Africa satisfies a considerable proportion of the NATO countries' need for types of strategic raw material which are in short supply; and the strong liberation movement which has spread in southern Africa is threatening the monopolies' rapacious interests.

We will adduce merely the main stages of the racists' nuclear race with the West's assistance.

Gambling on force in international affairs and the "cold war," after WWII the most aggressive U.S. forces of reaction and imperialism began to urgently replace and expand their military, including nuclear, arsenals. Plans for a nuclear attack on the USSR known by the names Dropshot and Trojan were drawn up in the United States at the end of the 1940's. Uranium was needed, and in large quantities, moreover. A search for it was begun with the help of British and American specialists, and this produced results in 1945 near Johannesburg and in Namibia.

The Atomic Energy Administration was set up in South Africa in 1949, and 3 years later the first plant for the enrichment of uranium ore was commissioned. In 1950 the administration signed with the United States and Britain a long-term agreement on supplies of uranium raw material. The U.S. Atomic Energy Commission made its equipment available to South African engineers and atomic scientists. South Africa's raw material reserves are currently put at 163,000 tons on its own territory and at

100,000 tons in Namibia, which it illegally occupies. Pretoria controls more than 20 percent of the capitalist world's uranium reserve and is its third biggest producer. And, moreover, the United States accounts for 8.3 percent of uranium imports from South Africa.

Within the framework of a governmental (precisely, governmental) agreement on cooperation between the United States and South Africa in the nuclear field signed in 1957 the American Allis Chalmers Corporation supplied the Safari-1 and Safari-2 nuclear reactors to South Africa's nuclear center--the township of [Valindaba]--in the first half of the 1960's. As the Belgrade newspaper POLITYKA reported, from 1956 through 1977 the United States sold South Africa more than 100 kilos of enriched uranium, which is enough to make 10 atom bombs.

The FRG began to take an active part in the creation and development of South Africa's nuclear potential at the end of the 1950's and start of the 1960's. According to the evidence of the foreign press, the construction of individual facilities of South Africa's nuclear industry became possible thanks to such West German monopolies as Siemens and Messerschmidt-Boelkow-Blohm; contacts were maintained with the West German dealers in nuclear death by a certain Donald Soul, who worked in South Africa's Atomic Energy Administration, and at the end of the 1960's by its ambassador in Bonn. The hectic activity of the ambassador, more accurately, of the emissary for special assignments was connected with the South African atom disciplies' access to the secrets of West Germany's nuclear research center in Karlsruhe. As the French monthly MONDE DIPLOMATIQUE reported, Western experts established that the method of enriching uranium in South Africa bears a "striking resemblance to the method" devised by Erwin Bekker--leader of the center in Karlsruhe.

French monopolies are also involved in the creation of a nuclear industry in the country of apartheid. "If France," the same MONDE DIPLOMATIQUE wrote, had become, in the expression of a South African minister, 'South Africa's best friend' in the 1960's and 1970's, it was precisely thanks to the extensive sales of ultramodern weapons and technology, which enabled Pretoria to build a powerful military-industrial complex. In addition, Paris by no means ignored the possibility of nuclear cooperation, which subsequently led to the signing of the 'contract of the century' --for the supply of two nuclear power stations to South Africa."

Each nuclear power station has a capacity of 900 megawatts. The scale of the construction project may be judged by the value of the contract, which is over $1 billion. Although France has officially opposed the nuclear armament of South Africa and has in recent years observed the embargo on arms supplies to this country, the construction of the power stations, which was begun in July 1976 in [Keberg], north of Capetown, is continuing. Some 500 kilos of plutonium will build up annually in its reactors by 1985.

If the South African racists are now having a go at an atomic bomb, they are doing so to a large extent because of the criminal close alliance with Western countries and their military-industrial corporations. Primarily they are directly responsible for the creation in the south of the continent of the racists' aggressive military machine.

It is fitting to recall in this connection that back in 1977 the Soviet press had published material testifying to the presence in the Kalahari desert (Namibia) of a nuclear weapons testing area. A TASS statement of 9 August 1977 emphasized that nuclear weapons in the hands of Pretoria "would create the most direct threat to the security of African states, would lead to a sharp escalation of instability and tension in southern Africa and would increase the nuclear threat to all mankind." This public exposure forced the racists to temporarily abandon the planned nuclear explosions. But in September last year it is highly probable that these tests were carried out in an atmosphere of total secrecy.

Tel Aviv should be put among Pretoria's other atom disciple-partners. Although the cooperation of the two odious regimes in the nuclear field is specially not advertised, it nevertheless exists. Citing the "belief of many specialists," the West German paper FRANKFURTER ALLGEMEINE noted the "close relations" between Israel and South Africa on questions of supplies of South African uranium to the Zionists and also the latter's readiness "to reciprocate." It was evidently a question of this "reciprocity" when the weekly NEWSWEEK, alluding to the belief of America's special services, wrote that the bomb which the racists were about to explode in the Kalahari desert just over 2 years ago could have been Israeli made. For the leaders of apartheir and racism, putting their trust in the "absolute weapon," are pursuing the goal of these regimes, which are a disgrace to mankind, with nuclear blackmail and the spread of their influence far beyond the confines of their countries' borders.

The Western press has reported that an investigation is under way into the possible explosion of a nuclear device on 22 September 1979 in the South Atlantic. Whatever this investigation reveals, a fact remains a fact: the most inhuman regime--the racist rulers in Pretoria--is pressing for nuclear weapons. The South African Government recently announced its intention of building a powerful complex for producing enriched uranium. Pretoria was evidently in need of nuclear material, many African press organs note, to start the mass production of nuclear weapons. It is difficult to exaggerate the danger which the apartheid regime's possession of nuclear weapons represents. After all, relying on the assistance of the NATO countries, the South African armed forces already have the vehicles for delivering nuclear warheads. Something else is widely known: the South African Government is one of the few which have refused to sign the 1970 Nuclear Nonproliferation Treaty, which has already been signed by more than 100 states. All the greater is the responsibility for the criminal alliance with the racists borne by the Western countries which, in violation of UN decisions, are helping the nuclear maniacs develop their own nuclear potential.

The newspaper SECHABA, which is published in Tanzania and is the organ of the African National Congress, the mass revolutionary-democratic organization, rightly warns: "The regime will be able to and will use its nuclear might to fight boycotts, embargoes and sanctions. It will be able to blackmail Africa and the international community and force them to consent to its policy of apartheid at home and the spread of its economic influence on the continent. Pretoria's behavior...is every reason to fear that this bellicose regime could use nuclear weapons as a desperate measure."

The fact that precisely now the South African authorities have pulled out the dangerous plan for the creation of an "association" of southern African states puts us very much on the alert. Pretoria is no longer satisfied with the place of outpost of imperialism in Africa which it has been assigned by the Western powers. The racists have now decided to operate with the sights set at long range--to create some "association" of African states under their aegis and extend the sphere of their influence. South Africa has already switched to practical steps aimed at cobbling together this grouping of states. One of the first acts in this respect was a broad conference in Johannesburg of politicians and industrial and financial bigwigs at which Prime Minister P. Botha expounded his idea. Need it be said that the hegemonistic plans of the inordinately ambitious premier received the South African industrialists' virtually unanimous approval.

In addition to Rhodesia and Namibia the racists put on the list of countries to be included in the bloc the states economically dependent on South Africa--Lesotho, Swaziland and Botswana. And in the future they see all sub-Saharan countries of the African continent participating in an anticommunist alliance.

But these calculations are being built without the host, without the freedom-loving African peoples. The independent African countries, whcih are supported by the progressive international community, decisively reject both Pretoria's hegemonistic plans and its nuclear blackmail, which threaten peace on the continent and worldwide.

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FINNISH MEDIA REACTION TO NORWEGIAN VIEWS ON NUCLEAR-FREE ZONE

LD031108 Helsinki International Service in English 0930 GMT 3 Jan 81

[Text] Norway has expressed interest in strengthening the nuclear-free character of the north. Norwegian Prime Minister Odvar Nordli specified in his New Year's address his country's views on creating a nuclear weapons-free zone in northern Europe.

Finnish television news analyst Knud Moeller noted on Friday that the statement by Prime Minister Nordli indicates that changes have taken place over the years. At the time of the original suggestion by President Kekkonen in 1963 for a nuclear weapons-free north, Norway and Denmark noted that the north already was a nuclear weapons-free area since these countries had refused to accept nuclear weapons on their territories in peacetime. In his statement on Thursday Mr Nordli noted that a nuclear weapons-free north could be achieved as part of a wider arrangement. Our news analyst Knud Moeller said that Mr Nordli apparently meant the same as Defense Minister Thorvald Stoltenberg in December. Mr Stoltenberg said then that if the north were to be made nuclear weapons-free the Soviet Union should remove (?tactical) nuclear weapons that could be directed at Norway.

Soviet reactions to these (?statements) are negative. This was reflected, for instance, in a comment released by the news agency APN before the end of the year. In a commentary Igor Pavlov noted that in a discussion on a nuclear weapons-free north a number of unrelated and unrealistic things had been put forward. Mr Pavlov pointed out that the Soviet Union is a nuclear power, while the Nordic countries are not. If the Soviet weapons in the Kola Peninsula, for instance, were to form the subject of discussion, U.S. weapons in the corresponding areas should also be discussed. In Pavlov's opinion, the main issue is to obtain guarantees that the United States would give up directing nuclear weapons against the Soviet Union from Danish and Norwegian territory.

The Norwegian prime minister said in his speech that he favored solving the problem in a wider framework. Radio Finland's news analyst said that Mr Nordli perhaps meant that the zone should also cover the Kola Peninsula and the Baltic region. If this is the case, Radio Finland's news announcer noted, Mr Nordli's statement will certainly not be the last in this discussion that has continued over the years. Mr Nordli's comments have, of course, a local political background in Norway as well. His statement was apparently aimed at reducing the criticism also from within his own Labor Party resulting from the projected U.S. weapons storage. There (?is) currently a popular movement in Norway for a nuclear weapons-free zone. This movement also includes Labor Party members.

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SUBATOMIC PARTICLE RESEARCH HIT BY BUDGET CUTS

Frankfurt/Main FRANKFURTER RUNDSCHAU in German 1 Dec 80 p 3

[Article by Karsten Plog: "Twilight Descends on 'Desy'"]

[Text] The waves of protest washed right into the Bundestag. In the debate on the government statement by Chancellor Helmut Schmidt, Schleswig-Holstein Minister-President Gerhard Stoltenberg reproached the cabinet leader with the fact that the government was turning off the financial tap for basic research instead of showing "confidence in the future." Stoltenberg was talking about the center for basic research in physics, "Desy," located in Hamburg, which was forced to begin the Christmas break 3 weeks earlier than originally planned because of financial problems. Accelerators and storage rings have been inactive since. The decisive factor was increases in the price of electricity from the Hamburg Electricity Works (HEW), whose major customer is Desy, with DM 22 million spent annually on electricity. In addition to that, the government had slightly reduced the DM 150 million budget for the "German Electron-Synchrotron," which is Desy's full, unromantic name. The chancellor took the opposition attacks so seriously that he spent a considerable time answering them in the debate. Schmidt assured them that there could be no question of endangering the internationally highly acclaimed scientific operation. He pointed out that, after all, Desy was always shut down during the Christmas period so that repairs or new adjustments could be carried out, and during the year partial shutdowns were nothing unusual.

Certainly the pre-Christmas enforced break should not be given too much importance, and work with Desy will continue in the coming year. But it will not run quite as smoothly as the chancellor described. The Ministry for Research is giving assurances that no unacceptable restrictions are being considered. In the case of this operation, however, the question must be asked, "At what pace can we complete the planned expansion?" The fact that Desy had to close down operation prematurely because DM 1.5 million is not available to pay the electric bill should be taken as a warning sign, and the preventive cry for help from the scientists is perfectly understandable. Naturally, at Germany's largest center for basic research in physics, opened in 1964 in the Bahrenfeld section of Hamburg on a former airfield, interest focuses on continuing the previously successful search for what constitutes the very structure of the world, for the smallest building blocks and their energies.

Today, 150 German and about 200 foreign guest scientists work at the center. Almost 40 university institutes from 11 nations, including the USSR, the United

States, China, Japan and several European countries, participated and are still participating in research work. Three physics institutes from the University of Hamburg are located on the grounds.

Even today there are scarcely any comparable plants in the world. The U.S. journal SCIENCE NEWS described Desy last year as "the laboratory with the most advanced equipment in the world for energy-rich collision of electrons with positrons."

In the center of the rooms, laboratories and workshops are "Doris" and "Petra," which are chiefly responsible for establishing the internationally outstanding reputation of the research facility. Both names are acronyms for highly complicated technical plants: "Doris" is a double-ring storage chamber, the 2.3 km-long Petra is a positron-electron storage ring. Using these devices principally, scientists are attempting to penetrate deeper into the structure of matter and to discover the ultimate, indivisible nuclei and the forces that bind them.

Faustian activities of this nature have long since moved out of tiny rooms with steaming and bubbling test tubes. Today the rule is that the more deeply research tries to penetrate matter, and the smaller the traces become, the greater the technological effort and expense for this purpose. In developing this new technology discoveries are made which can be used later in industrial production.

In past years there has been extremely rapid development in attempts to divide matter into smaller and smaller parts. What was taught just a short time ago in physics classes about atoms has to be expanded radically today--and Desy has contributed. By way of atoms, atomic nuclei, protons and neutrons, research has arrived at quarks and leptons, which are presently thought to be the final, indivisible building blocks of matter. The name quark is not an acronym like Petra or Doris, but was taken from a fairytale by James Joyce and means something like "midget" or "shrimp."

In order to discover these final building blocks--five quarks have been proved to exist so far--the scientists in Hamburg make electrons and positrons, which have been accelerated by means of giant magnets, collide at high speed. The result is a kind of "big bang," a miniversion of the event that might have taken place at the beginning of our universe

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PROGRESS IN NUCLEAR FUSION REPORTED

Paris ELECTRONIQUE ACTUALITES in French 14 Nov 80 p 2

[Article: "UV Lasers: France Takes a Step Toward Thermonuclear Fusion"]

[Text] The CNRS (National Center for Scientific Research) has announced that French researchers have just taken a major step toward mastering thermonuclear fusion for energy production, by utilizing ultraviolet laser radiation to trigger the fusion of two hydrogen isotopes, deuterium and tritium.

The experiment was conducted at the CNRS and Ecole Polytechnique laboratory in Palaiseau near Paris, by a team under Edouard Fabre, director of GRECO (Coordinated Research Group on Laser-Matter Interaction). The experiment will also be presented at the American Physics Society Congress held this week in San Diego, United States.

The value of the French experiment resides in its theoretical and practical demonstration, that the use of energies 10 to 100 times lower than those previously required with conventional near-infrared lasers, yields comparable results with UV-laser radiation. The point is that one of the basic problems of physics in mastering thermonuclear fusion is to obtain higher energy yields with respect to energy expended.

100 Million Degrees

Generally, in order to trigger a thermonuclear fusion event, hydrogen isotopes have to be heated to over 100 million degrees so as to obtain particles which will fuse at a density higher than 100,000 billion per cm 3, within a confinement time of about one second. Researchers are exploring several paths toward this threefold aim, not including the H-bomb, where energy production is considerable but instantaneous, and therefore not controlled as a function of time. One of these paths is that of magnetic confinement, where the isotope plasma is confined in a magnetic field (Tokamak system, for example.) Another approach is inertia confinement, where fusion is triggered by the compression of matter.

In laser systems, radiation-released energy is used to compress a small ball filled with deuterium and tritium. Their fusion releases energy.

In the Fabre team experiment, the balls or targets of deuterium and tritium were furnished by the Limeil Center of the AEC. Several tens of Gw transmitted through UV radiation to these targets, instead of the several terawatts required in infrared radiation, whose wavelength is longer, were sufficient to trigger fusion.

However, the question remains open among researchers as to whether magnetic or inertia confinement will yield the solution to the problem.

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'THERMOS' REACTOR TO PROVIDE HEAT FOR GRENOBLE

Hamburg DER SPIEGEL in German 15 Dec 80 pp 178, 180

[Article: "Nuclear Technology--Power Plant in the Basement"]

> [Text] French and Canadian nuclear engineers plan to heat housing complexes and factories by means of mini-reactors in the future--at the same time undermining resistance by citizens and authorities.

In order to publicize the project already decided on, Grenoble's city fathers had fliers distributed: According to these it was expected that as early as 1985 a major portion of the local offices and apartments would be heated by means of nuclear energy--the erection of a nuclear power plant in the city's immediate proximity was planned.

News of such caliber, presented as nonchalantly as it was, would no doubt have the impact of a bomb in Hamburg or Frankfut, for instance. But in the French industrial town at the foot of the West Alps with a population of nearly 170,000, the flier action had the impact of a dud: Pierre Corbet, director of the local "Centre d'etudes Nucleaires," registered "very little resistance by the public."

Recently L 'EXPRESS, the Paris news magazine, noted that the Grande Nation meanwhile is well on its way to becoming a nuclear state "in the forefront" of all other West Europeans and almost unimpeded by citizens' protests. And now the French want to be in the forefront as far as the implementation of the most recent idea of the nuclear technocrats is concerned--nuclear power plants en miniature, which are to be located in the midst of areas of industrial concentration and no longer as far away from the populated areas as possible.

The power plant planned in Grenoble serves as a demonstration project: Under the brand name of "Thermos" it will have a 100-megawatt (MW) capacity, but provide only about 5 percent of the energy supply produced by a large reactor of the conventional French standard type.

Contrary to the huge energy production plants located far away in the country, however, the future dwarf plant in Grenoble will not generate any electricity. Rather, "Thermos," a type of nuclear immersion heater, is to be connected to the remote heating system which is already in existence in Grenoble, and it is to supply hot water to heating units, showers, or washing machines as directly as possible. Some 30,000 households, in addition to trade enterprises, will be supplied by "Thermos," according to the planners' estimates.

Employing the minidesign France's nuclear engineers are following a trend which has been discovered elsewhere as well. Canadian as well as Soviet, Finnish and Swedish engineers have started work on minireactors and praise the alleged multiple advantages of the compact energy source.

In the eyes of the designers, "Thermos," for instance, whose reactor container of stainless steel is sunk into the bottom of a water basin, is not only considered to be nonpolluting, but also to be particularly safe: This plant does not require major units, e.g., cooling towers, as it heats up the water to a maximum of 130 degrees Celsius only; thus, the cyclic system is subjected to much less pressure than is the case in a large power plant, in which the temperature of the hot steam transported through the pipes ranges up to 300 degrees Celsius.

Further, the "Thermos" reactor core contains only about 3 tons of slightly enriched uranium--little as compared to approximately 100 tons in a 1,000-MW power plant, for instance. The builders claim that this is why only small amounts of toxic fission products can accumulate in the fuel chamber of the "Thermos" immersion heater.

Similar enthusiasm can be heard when engineers of the "Atomic Energy of Canada Ltd" (AEC) describe their most recent creation: Technically, "Slowpoke," also a minireactor for heating purposes, is a close relative of "Thermos," only smaller--a "Slowpoke" pilot plant operates with a mere 2-MW output.

The "Slowpoke" designers state that it is their primary goal to build the simplest, most robust and foolproof reactor possible. John W. Hilborn, AEC manager, says, "If we want to bring reactors close to people, they have to work reliably without sophisticated safety systems, and they have to be so simple that anyone will understand them."

Mass-produced simple reactors, as plain and robust as the former "Ford Model T" (Hilborn), could be installed in the basements of large hotel or office complexes, for instance, instead of oil-heating systems, according to AEC planning--following a Soviet example: Since early 1980 a 5-MW reactor has been heating apartments and workshops in Dimitrovgrad, a small Russian town.

Unlike most of the Western industrial nations, however, neither protests by citizens nor similarly strict safety provisions exist there. The nuclear engineers, so far fixated on the intimidating large reactor technology, want to eliminate both impediments now by means of their minipower plants in order to accelerate the stagnating business.

It is true that the miniature power plants are still considerably more expensive than comparable conventional plants, but in the opinion of the manufacturers the prices for "Thermos" and "Slowpoke" should be drastically reduced once the uranium heating plants are produced in series.

The French want their "Thermos" to become an export hit. At home, it can only be used under certain conditions: The number of remote heating pipelines is insufficient, and there is also a lack of heating demand in the largely mild French climate. But "Thermos" should be of all the more use for Russia, where it is colder, also in the sun-scorched countries of the Near East where it is to be utilized for purposes of seawater desalination. The French advertise that about 40,000 cubic meters of drinking water per day could be produced by means of the nuclear dwarf.

9544
CSO: 5100

BUILDING PLOGOFF NUCLEAR PLANT APPROVED; RESIDENTS RESIST

Paris LE MONDE in French 3 Dec 80 p 37

[Article by Special Correspondent Marie-Christine Robert: "EDF Has the Government's Green Light to Build the Plogoff Nuclear Plant"]

[Excerpts] Prime Minister Barre and Minister of Industry Andre Giraud have issued a decree dated 1 December, published in the JOURNAL OFFICIEL of 2 December, declaring the Plogoff (Finistere) nuclear power plant construction project to be in the public interest. This green light opens the way for a long procedure which will only be completed toward the middle of 1981 at the earliest. First, a survey has to accurately establish the property boundaries of the land in question, or about 70 hectares. Several hundred landowners, including some joint ones, will have to be identified. Then EDF will strive to buy the lots by mutual consent. Those who are unwilling will have to be served expropriation orders.

The public enterprise will be held to the normal practices of obtaining building permits, authorizations to occupy public maritime areas (over an area of 50 hectares), water usage and discharge permits, and so on. Opponents will probably try to use each of these steps to delay the progress of the project by organizing court appeals.

The work itself will be classified as "major construction" and could begin in the summer of 1981. It will continue until 1990. EDF asserts that it "wants to give an exemplary performance in that traumatized and oversensitive region." An advance team of five engineers is already at the site where they hope to prepare the way. In order to better integrate the plant into the region, for example, EDF is willing to forego construction of employee housing in favor of rehabilitating age-old dwellings in the villages. The first two reactors should be linked to the network in 1990.

"We Will Resist, but What Will our Neighbors Do?"

Plogoff--"Even if they send then thousand CRS (State Mobile Police), we won't stand for it." "We will fight all the way." "Plogoff lives will be sold dearly." Now that the Cap nuclear plant is officially being declared of public interest, the determination of the residents of the Finistere commune seems as unshaken as ever. But the days of general and spontaneous opposition such as took place during the public interest hearings that ended last 14 March, are now long gone. Today, resistance in Plogoff has become organized.

The cohesion demonstrated by the commune has elements of purification: two young municipal councilmen who accepted and EDF invitation to Clamart, where plans for the project were to be presented, found themselves sharply rebuked for their action by the watchdog committee during a municipal council meeting where their resignation was even requested.

Easygoing Generalities

The determination of the Plogoff population is not enough. Support from the neighboring communes is also needed; an elected official from Cap said that "there is a very strong antinuclear feeling in the region, but the solons sometimes have less radical reactions than the voters who put them in office." Recently, 26 municipal councilmen and mayors of the communes involved, participated in one of the frequent trips organized by EDF. Mrs Kerloc'h states that they came back disappointed. One of them nevertheless observed that "relations with EDF have changed quite a bit." Daniel Bouer (Socialist Party), antinuclear assistant mayor of Douarnenez, asserts that "previously, the policy was one of secrecy. Now we are being offered all-encompassing consultations. We are told to set our own requirements and determine our new directions. We are promised further discussions about the projected bridge for evacuation of nuclear wastes in Douarnenez."

This policy of easygoing generalities allows EDF to conceal its intentions and it limits the opponents' reactions. Especially since political divisions and economic considerations have resurfaced. Henri Cogen (Democratic Center), general councilman of the canton, asserts that "the plant has become inevitable. It is too bad that it is being located here, but since the decision has been made, we must extract the maximum benefits from it for our local activities." As for the mayor of Douarnenez, who until now was able to declare himself communist and antinuclear at the same time, (the municipal council's debate in opposition to the plant bears his signature), will he follow the Plogoff struggle all the way to the end?

Finally, Plogoff is also a quasi-ideological battle; that is, a confrontation between two lifestyles. Over there, in this burg which nobody had heard of, the veterans of Royale, the old soldiers, the sailors' wives have said "No" to Paris. Their refusal also addressed itself to the civilization of comfort, of unlimited energy, of so-called progress which destroys the environment and disturbs the age-old pace of life. During the earliest demonstrations, Plogoff was reminiscent of May 1968: there were assemblies where everyone spoke at once, it was a time of singlemindedness and imagination ruled.

Ultimately, the adventure of the burg is political, and the "Cap people" have discovered their identity as Bretons. The power plant project is a government one, a Parisian one. And this is another reason why it is being rejected.

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CSO: 5100

CIPE APPROVES CNEN 5-YEAR NUCLEAR PLAN

Milan ENERGIA NUCLEARE in Italian Apr-May 80 p 187

[Text] CIPE [Interministerial Committee for Economic Planning] has approved the 1980-1984 CNEN [National Nuclear Energy Commission] Five-Year Plan, which calls for a financial commitment of 2.89 trillion lire, of which 2.5 trillion is to be allocated to nuclear acitvities and the remainder to the development of renewable sources and energy saving. For the current year an expenditure of 390 billion lire out of a total of 415 billion is planned for nuclear activities.

The following is the verbatim text of the deliberations.

CIPE Deliberates

Approval is given to the proposals contained in the document by CNEN entitled "Guidelines for the Fourth Five-Year Plan (1980-1984)," which reads as follows:

1. Confirmation is given to the course of action outlined in the national energy program with particular emphasis on the program for electronuclear power plants. In this connection, CIPE is being asked to offer its support with regard to research on the safety of thermal reactors and the promotion of our national industry in accordance with the course of action formulated by CIPE itself in its deliberations of 11 January 1980 opting for a series of electronuclear power plants.

2. The termination of the CIRENE installation, already in an advanced stage and whose cost to complete is put in the CNEN document at 250 billion lire, despite certain known delays (the reactor was to have been operational during the period covered by the present plan), is on schedule; and this substantiates the capability of our overall national system to engineer, build, administer and safety-inspect a complete electronuclear power plant.

This accomplishment is also important in qualifying our national industry for participation in foreign markets.

3. Confirmation is also given to the proposal for a national research program in the fast reactor sector. However, subsequent phases of the PEC Project [Fast Reactor Project for Testing Fuel Elements], proposed by the CNEN document, require a further study of certain aspects: the anticipated costs and possible increases in those costs and the time required to complete the reactor in view of the many difficulties still to be overcome both technically and organizationally and clearly spelled out in the CNEN guidelines.

Moreover, further study must be given to the possibility of incorporating the PEC Project in international programs.

4. Confirmation is given to proposals made on the subject of the combustion cycle and, in particular, on collaboration between CNEN and ENI [National Hydrocarbons Agency] with regard to facilities for the retreatment, conditioning and disposal of radioactive waste.

5. Extending CNEN's field of activity to the sector of renewable energy sources and energy saving is one of the more significant points contained in the guidelines: in this sector the CNEN is to collaborate with the other energy organizations and with the CNR [National Research Council].

CNEN will principally have the role of coordinating the activities of research and industrial production, as well as that of technical instrumentation for the evaluation, maintenance and control of demonstrative projects made possible by contributions from ENTE [National Electrical Energy Enterprise].

6. High priority is given to indications contained in the guidelines relative to strengthening the structures and activities to be carried out in support of nuclear plant safety, environmental protection and human welfare.

CNEN is urged to assure maximum participation in possible EEC or international programs which, due to their high cost, cannot be supported by a single country and to assure proper coordination in national activities of that type.

Confirmation is given to the proposal to create an autonomous organization for protective and safety activities. Separation of CNEN's safety control function from that of industrial promotion should be carried out gradually in order to guarantee maximum efficiency on the part of the national safety control system even during the transitory phase.

The government will provide the proper legislation for the above purpose.

7. The new CNEN programs and the nature of the commitments which ENTE is called upon to carry out in support of public and private industry in collaboration with the other national energy agencies (ENI and ENEL [National Electric Power Agency]) reconfirm the need to give those programs institutional status, and this coincides with the proposal contained in point 4 of the deliberations of 23 December 1977. In this case the government will come up with the necessary legislation.

8. In consideration of the financial requirements indicated by CNEN for the 1980-1984 Five-Year Plan, a multiannual finance bill will be presented to parliament based on the investigations and verifications referred to in the preceding paragraphs; funds from the current budget will be used for 1980's requirements (overall fund).

8568
CSO: 5100

ITALY

SAFETY OF CAORSO POWER PLANT QUESTIONED

Tome RASSEGNA SINDACALE in Italian 20 Nov 80 pp 13, 47

[Article by Corrado Perna: "Safety Without Ideologies"]

[Text] A dispute dealing with safety has been taking place for some months at the Caorso electronuclear plant. Leading the initiative are the Piacenza CGIL [Italian General Confederation of Labor], CISL [Italian Confederation of Labor Unions], UIL [Italian Union of Labor] structures, the Regionale Emiliano Unitario, together with the category structures and the Council of Delegates. The magnitude of the problems raised, their complex nature, and the very character of the dispute dealing with nuclear safety, have determined this political choice. This is therefore a novel dispute given its objectives and the forces taking part. The reason behind this effort, the first ever in Italy dealing with a nuclear plant, lies in the awareness that problems of such import directly involve the workers and in many cases the surrounding population. It involves an experiment on how to face not only nuclear problems but also problems dealing with the general issue of high risk plants. Judging by initial results, the road taken was the right one, so much so that one may place the matter in perspective as a national point of reference. The ground chosen for the confrontation and the struggle was decisive. Casting aside all abstract theories or purely ideological debates dealing with the nuclear question, focus has centered on the singling out of all security issues worthy of merit, just as they were brought forth by the employees' studies or the employees' charges. The central issues came to the surface thanks to input from the workers and technicians and to the basic point of agreement reached through the adoption of a political and logical acceptance of ground rules to analyze the problems based on the reality of working conditions and on the actual labor's organizational structure. Brought into question were those reassuring statements on safety, issued at the Venice Conference on Nuclear Safety, which are based on standard theoretical comparisons of Italian plants and those of industrialized nations, in particular those of the United States. Specific mention should be made of the technical archives of the plant's machinery. Though lengthy listings of security standards were bandied about at the Venice conference, no one, with the exception of the labor union, made mention of the fact that at Caorso, the complete plant's technical archives were, and for the most part are still missing. This has been admitted openly by ENEL [National Electric Power Agency]. This matter, which was brought to the fore by the labor unions, has moved the Ministry of Industry to suspend ENEL's license to operate the plant until the archives are complete.

The forceful confrontation with ENEL, and with the builder, Ansaldo Meccanico Nucleare, which is still present at the plant site, also touches on other matters. We make mention here of just a few. The hiring, on a full-time basis, of personnel not employed on a full-time basis. This is a safety matter of significant importance affecting the continuous flow of information between who manages the plant and who works there. The Harrisburg incident highlights the very training received by the plant's employees as a primary guarantee for the plant's safe operation. Some results originating from these issues have already been noted, but organizational slippage, as well as ENEL's cultural and philosophical management percepts, are grave and worrisome. ENEL, in fact, is preparing to manage the plant in a traditional manner. In other words, managing it the way it would manage a hydroelectric plant. ENEL itself has admitted that a minimum of 2 years will be needed to achieve an adequate training standard needed for maximum safety.

The labor union's action did not stop here. It dealt with the matter involving information directed to the population regarding the plant's characteristics. This led to positive thought partial results. Also, it touched on the matter of emergency planning in case of accidents. On this last point, it should be said that the observations, which were general in nature and prepared by local organizations and by labor unions, not only were not studied by the Piacenza prefecture, but their details only came to light a few weeks ago, and furthermore, no mention at all is made of aid stations. And here we face another problem, namely the necessity to modify DPR No 185 and 1964 on nuclear safety, which excludes any action taken on part of local organizations and social groups while entrusting problems dealing with safety control to CNEN [National Nuclear Energy Commission] and the management of operational procedures in case of accidents to the Ministry of the Interior. This is an absurd way of doing things, not only in view of the role assumed nowadays by local groups regarding their legal responsibilities, but also because of the tasking of safety control directives to CNEN, the group responsible for promoting nuclear energy. Here one is faced with the need, by now acknowledged by all, of separating the section whose function is to control safety from that whose function is to promote. This also has yielded results, namely the setting up of a commission with the Ministry of Industry tasked to modify present laws dealing with nuclear safety, especially with DPR No 185 of 1964. Finally one must also consider those problems relating to the instrumentation and the management of preventive medicine at the plant. This item is to be cancelled from the national health system and introduced into local health organization as called for by the recent reform.

Without attempting to exclude projects proposed by the state from the possibility of being included in a centralized framework regarding the safety of workers and citizens, a project of this magnitude has evidenced grave superficialities and in some cases, irresponsability. We make particular reference to ENEL, which, involved in a project of such high stakes, not only appears ill-equipped when called upon to constructively face the labor union's challenge, but is actually hindering the process by bringing into play wretched, pretentious obstructions. According to ENEL, the Caorso matter should be limited to the competence of the electrical labor unions and the Council of Delegates while excluding the regional CGIL, CISL and UIL labor unions. This is that symptom of cultural and well as political deficiency that characterizes the public electricity organization, of which we spoke before. These are absurd, prejudicial questions, almost of a corporative nature, if not worse, that must be beaten back. An organization that still operates in this manner gives doubt of not being at the height of the tasks entrusted to it by the community as a whole.

9209
CSO: 5100

POPULATION OPPOSES NUCLEAR WEAPONS, PEACEFUL USE OF ATOM

Zurich NEUE ZUERCHER ZEITUNG in German 9 Dec 80 p 4

[Article by pmr: "The Nuclear Qualms of the Dutch--Against Nuclear Weapons and Peaceful Use"]

[Text] Brussels, 6 Dec--One year ago the Dutch attracted global attention to their nuclear qualms regarding the deployment of 572 nuclear medium-range missiles (Persh-2 and Cruise Missiles) in Europe. Since then they have not stopped discussing any form of utilization of nuclear power in depth, with the loyalty to principles inherent to them. Action groups and citizens' committees have mushroomed. Unconditional rejection of nuclear weapons and unconditional rejection of nuclear energy are very closely related issues which sometimes even merge.

Campaigns of Rejection

Hardly a week goes by without the newspapers reporting on new antinuclear protests. With the help of their chaplains, 30 officers founded a "Peace and Security Council" to emphasize their refusal to use nuclear weapons in case of emergency. Many citizens do not remit part of their income taxes to the tax authorities, but to a peace movement instead, because they do not wish their money to spent for defense purposes. Housewives pay their utility bills in small installments to confuse the administration of the two Dutch nuclear power plants. The synod of the Reformed Church professed to unilateral nuclear disarmament and publicized this recommendation in a pastoral letter to all parishes. The church fathers wrote that the multilateral disarmament negotiations so far had not prevented more and more new and abhorrent arms from being installed. The Dutch should now therefore set an example without bargaining for a return.

The nuclear issue is also a crucial one on the highest political level. The largest party of the country, the opposition Workers' Party (PVDA) is facing the alternative of either losing its former prime minister and top candidate for the May elections, Joop den Uyl, or shifting to a less radical position in the nuclear weapons issue. Den Uyl declared unequivocally that he will not run as a candidate for the next election if his party continues to insist on abandoning all of the Netherland's obligations regarding nuclear weapons within NATO. Although the 61-year old former prime minister advocates a reduction of Dutch units ready to be equipped with nuclear warheads, he considers it impossible to do away with them completely within the upcoming cabinet session. Therefore he does not want a demand for this to be included in the party platform. The numerous hotheads within PVDA, however, sweep these arguments off the table and accuse the "grand old man" of their party of "blackmail."

Contested Agreements

There have been heated discussions in the Dutch Parliament for weeks on two agreements concluded with France and Great Britain regarding reprocessing of spent fuel rods of the two Dutch nuclear power plants. In addition, the start of "society's great discussion," which is to bring a final word on whether nuclear energy should be utilized in the Netherlands in the future, is being delayed. There has been a time-consuming, futile tug-of-war regarding the processing agreements which provide that radioactive waste be returned to the Netherlands after 1995. The two partner companies under private law, Cogema of France and British Nuclear Fuels, resist publicizing the agreements because they do not wish to release certain commercial and technical conditions. The members of Parliament, however, feel that they cannot support agreements the exact contents of which are not disclosed to them. Up to the beginning of this week, it looked as if Parliament would finally give in. But then the Christian Democratic party faction of the government (CDA), supported by the opposition, demanded after all that the agreements be disclosed to all of the 150 deputies of the Second Chamber. It is not expected in The Hague, however, that the Christian Democrats will risk a government crisis if the cabinet is not able to comply.

Reluctance To Decide

"Society's great discussion" has been a slowly burning issue of Dutch internal politics for over 2 years. Although de facto the nuclear energy debate gained full speed a long time ago--with the result even being anticipated more or less: of the country's major parties, only the liberal VVD advocates nuclear energy--the formal discussion for which the National Energy Council has stipulated a three-phase schedule has not even begun, because Minister of Economics van Aardenne has been looking in vain for a "discussion leader" for a year. Several prominent figures who do not wish to get burned by this hot issue have already declined the minister's offer. Initially, the "national discussion leader" is to have data collected, as complete as possible, and then present it to the 14 million Dutch for discussion at various events. It is hoped that this will be in early 1983 at the latest. Last week when the minister of economics suggested beginning without a discussion leader for the time being, he created a storm of indignation. There are more and more voices, though, who feel that the entire discussion scenario is superfluous because it serves as a cloak for hesitating politicians only, as most of the parties have already made up their minds. As the Dutch sit on a large natural gas pocket, however, which will last for at least another 20 years, they can still afford these vacillations.

Results of Surveys

According to a survey which was published on Friday in ELSEVIERS a weekend magazine, 53 percent of the population are against deployment of nuclear weapons in the Netherlands. Only 39 percent advocated it in order to offset Soviet military power. Eight percent did not voice an opinion on this issue. Forty-eight percent of the Dutch, however, were of the opinion that the West should have nuclear equipment in principle; forty-six percent rejected even this.

9544
CSO: 5100

INSTITUTE CHIEF SEES ATTEMPTS TO CIRCUMVENT NUCLEAR PLANT LIMIT

Stockholm DAGENS NYHETER in Swedish 25 Nov 80 pp 1, 17

[Text] The nuclear power industry may circumvent the result of the popular vote by increasing the capacity of the reactors. In that way, an electricity production corresponding to a thirteenth reactor will be achieved. The Oskarshamn power group has already requested that the capacity of Oskarshamn 2 be increased.

Bo Lindell, chief of the National Swedish Institute of Radiation Protection, now states that the increase in the capacity of Oskarshamn 2 may be followed by similar requests for other reacters.

"However, this is a question that will have to be decided by the politicians," Bo Lindell writes in a letter to the National Swedish Nuclear Power Inspection Board.

The National Swedish Nuclear Power Inspection Board has recently recommended that the government agree to the increase in the capacity of Oskarshamn 2, seeing that 'the safety is not being jeopardized.' Bo Lindell is a member of the National Swedish Nuclear Power Inspection Board but was unable to attend the meeting in which the Oskarshamn question was discussed. He has instead written a letter to the National Swedish Nuclear Power Inspection Board.

"As far as radiation protection is concerned, the increase in capacity is of little consequence," Bo Lindell writes. "This despite the fact that the amount of waste from Oskarshamn 2 will increase by 6 percent. But I still have got a somewhat uneasy feeling seeing that the increase in capacity of Oskarshman 2 may come to form a precedent. It would be inopportune if the capacity of Barseback were to be increased correspondingly."

Bo Lindell mentions that the U.S. Nuclear Power Inspection Board (the NRC) has decided to freeze the capacity of nuclear reactors located in the vicinity of big population centers.

"I see no reason why we should be less cautious than the NRC, especially since we are talking about a surplus power capacity in Sweden in the eighties," Bo Lindell says. "That is why I hesitate to agree to an increase in the capacity of Oskarshamn 2, although it is located in a thinly populated area."

Bo Lindell disapproves of the fact that the recommendation from the National Swedish Nuclear Power Inspection Board to the government does not contain the least amount of hesitation.

"The limit at 12 reactors set by the popular vote was not set for purely technical reasons," Bo Lindell writes. "The National Swedish Nuclear Power Inspection Board should, therefore, have drawn attention to all of the conditions in connection with its recommendation. The issue now appears to have become completely belittled and uncontroversial, which, of course, it actually is not."

Bo Lindell's letter has now been sent to the government as well, which will be making the final decision on the request from Oskarshamn.

According to the request, Oskarshamn intends to increase the capacity from 580 to 615 megawatts. That means that the power production will increase by 6 percent but also that the amount of radioactive waste formed will increase by 6 percent.

"In addition to more waste, the temperature in the reactor will increase. If an accident should occur, everything will happen more rapidly when the capacity is higher," Bo Lindell tells DAGENS NYHETER.

The reason why Oskarshamn has applied for permission to increase the capacity of Oskarshamn 2 is quite simply that the reactor is functioning better than expected.

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CSO: 5100

BRIEFS

URANIUM PROJECT AIRED--The LKAB Mining Company (Luossavaara-Kiirunavaara AB) will be mining 300-400 tons of uranium annually at Pleutajokk in the Arjeplogs municipality. An application for permission to do so will be submitted to the government at the turn of the year. If the government, the Riksdag, and the Arjeplogs municipality agree to it, the mining will be started in 1984. Nuclear power companies are interested, as it is nice to be somewhat self-sufficient, as far as uranium is concerned. Moreover, approximately 200 new jobs will be created. The deposits at Pleutajokk contain approximately 6,000 tons of workable uranium. This will be sufficient for the operation of twelve reactors for 4-5 years. The ore at Pleutajokk has a higher uranium content than the shale at Ranstad. As is well-known, the Ranstad project is about to be closed down, partly because the uranium price has dropped in the world market and partly because of the big environmental problems. The LKAB Mining Company participates in the Ranstad project. The attention will now be focusing on the Pleutajokk project instead. Erik Svenke, chief of the Swedish Nuclear Fuel Supply Company, says that the Pleutajokk uranium is interesting. The Swedish Nuclear Fuel Supply Company, therefore, has participated in and paid for the investigations concerning the deposits. Erik Svenke stresses, however, that the investigations into the economic and technical aspects of the project have not yet been completed. The work environment, for example, will have to be acceptable. For quite large amounts of radon are formed when uranium is mined, and radon can cause cancer. In the eighties, Sweden will need approximately 12,000 tons of uranium for the operation of the reactors that have been decided upon. Contracts of purchase for 4,300 tons of that quantity have been signed. The suppliers are France, Canada, and the United States. [Text] [Stockholm DAGENS NYHETER in Swedish 27 Nov 80 p 39] 7262

BARSEBACK-2 LONGER LIFE--Sydkraft will prolong the operating time for the nuclear reactor Barseback-2 from 12 to 18 months. In that way, the maintenance costs will be reduced, at the same time as a somewhat larger amount of power can be produced at Barseback-12. However, Sydkraft has no plans to increase the capacity of its reactors, contrary to what the Oskarshamn power group is known to have requested for Oskarshamn. Sydkraft will shortly ask the National Swedish Nuclear Power Inspection Board for permission to operate Barseback-2 for 18 months without a shutdown. If that request is granted, the extension will be carried through after the fuel exchange in the summer of 1981. A nuclear reactor is normally operated for 12 months, when it will be stopped for fuel exchange and maintenance. The shutdown will last for 1 month but may be longer if major maintenance work will have to be undertaken. [Text] [Stockholm DAGENS NYHETER in Swedish 28 Nov 80 p 9] 7262

LOAN FOR FORSMARK-3--The Forsmark power group will take a bond loan of 200 million kronor to build Forsmark-3, the eleventh nuclear reactor of Sweden. Vattenfall has asked the government's permission to provide guarantee for the loan, which will run for 10 years with an interest of 13-13.5 percent. The Riksdag has agreed to Vattenfall providing guarantee for a total loan of 6,530 million kronor, which the subsidiary company, the Forsmark power group, will take in Sweden and abroad. So far, the company has borrowed 5,360 million kronor for construction at Forsmark. The three reactors at Forsmark will be producing approximately 18 tWh (billion kilowatthours) annually. Forsmark-1 will start commercial operation in a few weeks. The test operation of Forsmark-2 will be started in the days following a 3 weeks' charging with nuclear fuel. Forsmark-3 will be started in 1985 and can then be ready for heat deliveries to Uppsala and Greater Stockholm by early 1989. [Text] [Stockholm DAGENS NYHETER in Swedish 28 Nov 80 p 9]

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END

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 109

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NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 109

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BRIEFS

THORIUM ORE FOUND--Thorium ore was found in the continental shelf at the estuary of Shoukulan River and the offshore area near Taitung City in eastern Taiwan. The discovery was made by the research ship "Chulien" of the Oceanic Research Institute of National Taiwan University recently. Professors and students explored the continental shelf there and found thorium containing monazites. This is another important discovery after the finding of the same mineral deposits in the sandbanks in southewestern Taiwan. The National Science Council (NSC) said the mineral resources there are worthy of further exploration in view of the value of thorium as an important nuclear fuel and material. It was proved by the NSC that there are about 550,000 metric tons of thorium deposits at the seashore and sandbanks of Pachang River, Putzu River and Peikang River in Chiayi County. [Text] [Taipei CHINA POST in English 9 Jul 81 p 10]

PARAGUAY URANIUM VENTURE--The Republic of China will continue exploring uranium ore in Paraguay in cooperation with South Korea and the United States, according to the Industrial Technology Research Institute. Without giving details, a spokesman for the institute described as "promising" the joint exploration efforts in the South American country. A number of spots in Paraguay may have uranium deposit and are now under careful survey by all parties concerned, the spokesman revealed. The spokesman also said that engineers and technologists are planning researches on several mountain areas in northern Taiwan in an effort to seek uranium deposits at home as a source of atomic energy for power generation. [Text] [Taipei CHINA POST in English 5 Jul 81 p 8]

CSO: 5100/4912

BRIEFS

URANIUM EXPORT FOR TECHNOLOGY--Buenos Aires, 25 Jul (TELAM)--Buenos Aires media circles are speaking about the possibility--which is being studied by National Atomic Energy Commission officials--that Argentina may start exporting concentrated uranium in exchange for receiving relevant nuclear technology. The favorable prospects for a significant growth of uranium reserves are based on the fact that only 10 percent of the Argentine territory likely to hold uranium deposits has been surveyed and on the recent discoveries made in San Rafael Department, Mendoza Province. According to reports published last April, a new layer of uranium was found in a zone near the large Sierra Pintada deposit. The discovery was made at a depth of 500 m. The probable thickness of the layer is 18 m and its purity 1,300 kg per cubic meter of rock. The specialists also believe that this deposit is part of other promising discoveries made in the region of Las Violetas Cattle Ranch beyond Los Terneros Hill. Despite the reserve maintained regarding figures, the reported data seems to indicate that the new reserves, whose volume has not yet been established, far surpass those already verified for the main Tigre 1-La Terraza deposit, which are in the neighborhood of 16,000 tons. Hypothetically, if all uranium-bearing ore of the country were exploited, the probable reserves of the country might total 400,000 tons, which would justify the decision to start exporting. [Excerpts] [PY312036 Buenos Aires TELAM in Spanish 1120 GMT 25 Jul 81]

CSO: 5100/2295

EXPERTS DISCUSS ARAB NUCLEAR POTENTIAL, BOMBED IRAQI REACTOR

London AL-MAJALLAH in Arabic No 71 20-26 Jun 81 pp 20-22

[Interview with Drs Theodore (Winkler) and Daniel (Bogan), two experts in the field of nuclear power and weapons, in London, by Ilyas Harfush; date of interview not given]

[Text] The Israeli Raid on Tammuz.
Two Nuclear Experts Give an Interview to AL-MAJALLAH. The Arabs Will Possess Nuclear Power by the Mid-Eighties. Iraq, After the Israeli Attack, Will Continue the Development of its Nuclear Program.
The Middle East Runs the Risk of Having a Nuclear Confrontation in the Future.

No nation in the world has ever done what Israel did last week against the Iraqi nuclear reactor Osirak, or Tammuz, which is located in the area east of the city of Baghdad, beyond the banks of the Tigris River. The thing which has been most alarming to observers and officials in the capital cities of the Western countries, with regard to the Israeli planes' attack on a nuclear facility which enjoys the legal backing and support of the International Commission for Non-Proliferation of Nuclear Power, is the fact that this act of aggression could open up the door to acts of aggression of this type by various countries against each other. This is not very encouraging in terms of future prospects for world peace. For example, what would prevent India, in the future, from destroying the nuclear reactors in Pakistan on the pretext that Pakistan is making nuclear bombs to be dropped on Indian cities? And what would keep the two superpowers from using the same pretext as a basis for attacking the nuclear targets in each other's territory?

There are still no conclusive details about the extent of the damage which has been inflicted on Iraq's nuclear reactor. But Iraqi officials assure that Iraq, in the near future, will be able to resume the work previously engaged in [in connection with its neclear reactor].

The French also assure us that their guarantee that the Iraqi nuclear reactor will be used for peaceful purposes is based on three factors, which are as follows:

1. Iraq agreed to sign an international treaty for the non-proliferation of nuclear weapons (whereas Israel has refused to sign this treaty). Also, observers from the

International Atomic Energy Commission periodically make visits to the nuclear facilities in Baghdad. Their last visit to Baghdad was in January of this year.

2. In the nuclear cooperation agreement between Iraq and France, which began to be in effect in 1975, there is a clear stipulation which says that Iraq will return to France the uranium which has been treated with nuclear radiation in its reactor. It is a known scientific fact that this is precisely the critical stage during which uranium is transformed into plutonium (the material used to make nuclear bombs).

3. In more than 40 different countries of the world there are 70 nuclear reactors of the type which Iraq has. It is not possible to say, as Israel claims, that all of these reactors are being geared toward the production of nuclear bombs.

However, the major questions concerning this subject which continue to be the focus of interest on the part of the Arabs are: Will it be possible for the Iraqi nuclear reactor to function with the capacity which it previously had? What is the actual strength and capacity of Israeli nuclear power (which almost no one ever talks about)? What other countries in the Middle East are capable of playing a prominent role in the field of nuclear power? Was it possible to protect the Iraqi reactor against the Israeli attack? And will it be possible to protect other reactors of the same type in the future?

AL-MAJALLAH met with two experts in the field of nuclear power and weapons who work in the Institute of Strategic Studies in London. They are Drs Theodore (Winkler) and Daniel (Bogan). Each of them was interviewed concerning this important subject.

The First Interview

The first interview was with Dr Theodore (Winkler). Here is its text:

[Question] What is the actual capacity of the Iraqi nuclear reactor which was bombed by Israeli fighter planes? And what are the possibilities for using this reactor for the production of nuclear weapons in the future, as Israel claims it will be used?

[Answer] It is necessary to distinguish between two elements when dealing with the subject of Iraq's nuclear porgram. There is the short-term element, and there is also the long-term element. The Iraqis were able to obtain quantities of enriched uranium for their nuclear reactor. But these quantities of uranium are not necessarily for the production of nuclear weapons. In any case, there are doubts about how big the quantities of uranium were that Iraq obtained from France. Some reports say that they amounted to no more than 12 kilograms of uranium, and other reports say that Iraq received other shipments and that the total quantity of uranium which it received was more than 70 kilograms. For this reason it is difficult to determine the actual capacity of the Iraqi reactor. This amount of uranium, when processed, can be used to produce from 1 to 5 nuclear bombs. This of course does not mean that it was necessary to destroy the neclear reactor because the Tammuz reactor still had not reached this stage. But Israel felt that, in the long run, this reactor would constitute a danger to it. However, it is a generally known fact that reactors which utilize such large quantities of uranium, as is the case with the Iraqi reactor, are not the ideal reactors to be used for the production of plutonium

--which is the basic material used to make nuclear bombs. In all of the nuclear reactors which the various countries have today, plutonium is produced by means of natural and direct processes. It is difficult to produce uranium for military purposes by using reactors which contain very large quantities of uranium as does the Osirak reactor. In any case, Iraq did not possess the capability of producing plutonium from uranium. There remains the question about whether or not the Israeli raid destroyed the quantities of uranium which Iraq had. There is no doubt that this Israeli attack has dealt the Iraqi nuclear program a blow which will set it back by a period of from several months to several years, depending on the extent of the damage. But I do not believe that the Israeli raid succeeded in destroying Iraq's quantities of uranium because the Iraqis, according to the information which I have, had already put the uranium in underground tunnels after the attack which took place last September.

[Question] Does this mean that Iraq is still able to operate the nuclear reactor at the present time?

[Answer] I am inclined to think that the nuclear reactor did not contain a large amount of uranium when the bombing was going on. For this reason I would really be surprised if Israel succeeded in destroying all of the uranium charges which Iraq had. However, these charges need to be reused for a period of time which could be as long as several months, a year, or 2 years.

[Question] Do you have any reason to believe that Iraq was intending to pursue the production of a nuclear bomb?

[Answer] As I have said, possessing uranium is one thing but producing a nuclear bomb is something else. From the scientific point of view, the production of a nuclear bomb is a process which is both complicated and difficult. You have to carry out the processes of transformation and fission of the uranium, you have to set up the "furnace," in which the nuclear radiation is ignited, in a suitable place, and you have to know the actual amount of radiation that has to be used. All of these processes are not easy, and they cannot be carried out overnight. Even if Iraq were able to overcome all of these barriers, there would still remain the political barrier--which is a very important one. Iraq has pledged to the International Atomic Energy Commission that it will use its nuclear power for peaceful purposes. This commission has inspected the nuclear reactor in Iraq numerous times, the last time being last January, in order to make sure of this. If Iraq intended to pursue the use of its nuclear power for military purposes, this would mean a major change in the policy which it has followed up till now. I do not believe that the Iraqi government is moving in this direction. For this reason I believe that the Israeli raid was based on numerous erroneous consider tions. And the result will be that Iraq, in the future, will rebuild its nuclear reactor and will continue with the development of its nuclear program.

[Question] Some observers feel that it will be difficult for Iraq to do this in the future, in view of the fact that cooperation with the new French government will not come easily. Do you believe that this factor will constitute a barrier to Iraq's nuclear program in the future?

[Answer] This is a difficult question to answer because it depends on two factors. First of all, there is the matter of how extensive the damage was which the Iraqi installations suffered. If the damage was only slight, as I believe to be the case, then the Iraqis will be in a very good position to negotiate with France and Italy. They can emphasize the fact that they have signed the treaty for non-proliferation of nuclear weapons, and they can emphasize the fact that they are utilizing their nuclear power for peaceful purposes. There is no reason for not helping them to repair the damage which has been inflicted on the reactor. But if the installations have suffered extensive damage, then the French and Italians, who are the ones who are helping in the development of the Iraqi program, will say to the Iraqis that they are prepared to repair the damage on the condition that Iraq agree to basic limitations of its nuclear program. For example, Iraq will have to agree to exchange its uranium charges for other quantities of fuel whose radiation cannot be used for the production of plutonium. France attempted to pressure Iraq into agreeing to this condition in 1979 after the Osirak reactor was damaged in France, but France failed in this endeavor. However, it is certain that President Mitterrand will be less inclined than his predecessor President Giscard d'Estaing to continue this program of cooperation--which began in the mid-seventies when Jacques Chirac was head of the government--with many different governments, the most prominent of which are Iraq and Pakistan.

Israel's Nuclear Power

[Question] What are the facts about nuclear power in Israel?

[Answer] Since the sixties Israel has been saying that it will not be the first country to introduce nuclear weapons into the Middle East. During the early seventies Israel also said that it will not be the second country to do this. It is certain that Israel's plan was based on guaranteeing that no neighboring country would mount a surprise attack on it, using nuclear weapons. Since the 1973 War Israeli authorities have been stating that they are pursuing the possession of nuclear weapons. In any case, it is difficult to judge the extent of Israel's nuclear power on the basis of statements made by its leaders. Foreign observers, including experts in the CIA, assure us that during the 1973 War Israel received unspecified quantities of nuclear weapons--possibly as many as 13 such nuclear weapons--and that they are hidden in underground tunnels. Naturally it is difficult to confirm such information because Israel will not let any international commission inspect its nuclear power [installations] or make verifications concerning Israel's purposes for possessing this nuclear power. We can be sure that Israel has reached the advanced stages in the production of nuclear weapons by using atomic energy. What this means is that even though Israel might not possess nuclear weapons now, it still possesses the scientific and technical capacity to produce them. Basically it was the French who started helping Israel in the field of nuclear power. This cooperation began with the Dimona reactor during the late fifties. This reactor became operational during the mid-sixties. Israel then developed this reactor in cooperation with French experts. There is also another reactor built by the Americans which is for the purposes of nuclear research. It is subject to international inspection, and is not intended for military purposes. Furthermore, Israel has obtained quantities of uranium from the phosphate mines in the Dead Sea area as well as from the Negev Desert. All things considered, Israel possesses a real and advanced capability in the field of production of nuclear weapons.

[Question] What other countries in the Mildle East possess nuclear power?

[Answer] As I have said, Israel, without doubt, is the country in the Middle East which is the most advanced in this field. Iraq was moving fast in the direction of the nuclear option, although it was a long way from being able to produce nuclear weapons themselves. During the mid-sixties Egypt obtained from the Soviet Union a small reactor for research which it then named "Al-Qahirah" ["Cairo"]. Egypt is now negotiating with various Western countries, including the U.S. and France, concerning furnishing Egypt with new reactors. It is clear that Egypt is not interested in producing nuclear weapons as long as there is no nuclear threat against it, particularly from Libya. Since the mid-seventies Libya has been trying to obtain nuclear bombs. There are stories which say that the head of the Libyan government, 'Abd al-Salam Jallud, went to China in 1970 and wanted to buy nuclear weapons from them, and that the Chinese authorities did not agree to this request of his. There are also other stories which say that Col Qadhdhafi is prepared to pay a billion dollars to any country which will furnish him with nuclear weapons. Although Libya signed the treaty for non-proliferation of nuclear weapons in 1975, it is still displaying interest in the aspects of nuclear technology. In 1975 it signed a nuclear cooperation treaty with the USSR which permitted it to obtain a 10-megawatt reactor for research purposes which was set up on the shore of the Mediterranean Sea and was named "Jalat." In any case, Libya has had differences with the USSR concerning the development of Libya's nuclear capability. The fact is that Libya is a long way from either producing or possessing nuclear weapons at the present time. As for cooperation between Libya and Pakistan, there is information according to which shipments of uranium have gone from Niger to Pakistan via Libya. But the two governmnts have not taken any official positions which would indicate that there is any type of nuclear cooperation between them. In any case, even if Pakistan were to produce nuclear bombs, I do not believe that Libya would succeed either in obtaining such bombs or learning how to make them. Syria is a long way away from having nuclear weapons. It has two small reactors which it obtained from the USSR, but they are the smallest types of nuclear reactors. Jordan has absolutily no nuclear capability, nor does Sudan, or any other [Middle Eastern] country. During the days of the shah, Iran was developing nuclear plans for itself, but these plans came to an end with the fall of the shah and with Khomeini's takeover of the government. In the Indian Ocean area Pakistan is the most advanced country in the field of development of nuclear technology. However, it is difficult to judge how close Pakistan is to producing nuclear weapons. The American intelligence agencies estimate that Pakistan may reach this stage within from 18 months to 2 years. In 1974 India began a nuclear program for peaceful purposes, and right now there is discussion concerning developing this program. The reason for this is the fact that Pakistan has made progress in the nuclear field and India and Pakistan have traditionally been at odds with each other.

The Region Runs the Risk of Exploding

[Question] Do you believe that there is any possibility of protecting nuclear reactors in the Arab countries from any future Israeli attack such as the attack which was made on the Iraqi reactor?

[Answer] The Israeli raid proved that it is difficult to protect such reactors by using means and measures of defense which are presently available. For example, Israel has very advanced radar systems. For this reason, an attack on the Dimona reactor by Iraq or any other Arab country would be a more difficult operation than was the operation which the Israelis engaged in. This is why Saudi Arabia has asked the U.S. to give it the AWACS planes so that it could develop its capability of monitoring and protecting its air space when confronted by operations of this type. I believe that the Israeli raid will cause Saudi Arabia to increasingly urge the U.S. to give it the AWACS planes, because the prevailing feeling is that if Israel was able to hit Baghdad then it is also able to hit the Gulf area.

[Question] What do you have to say about apprehensions that the Middle East, in view of this race to possess nuclear weapons, is moving toward a nuclear confrontation in the future?

[Answer] No one can sleep easily as long as the Middle East is being supplied with nuclear power like this. It is the most tense area of the world and is full of disputes of all sorts. Of course this does not mean that nuclear war is likely to happen in the Middle East either today or tomorrow. But what could happen is that this change in Israel's tactics--that is, the bombing of nuclear installations in Arab countries which Israel feels are a danger to it--could also lead to a change in the strategy of the Arab countries and could lead them to pursue the achievement of a type of nuclear balance in relation to Israel's power. For example, I expect Saudi Arabia to help Iraq repair the damage which was inflicted on its nuclear reactor and I expect the Arabs to pursue development of their nuclear potential more than they have in the past. As for the near future, I think that by the mid-eighties the Arab countries will achieve the same level of nuclear capability which Israel possesses at the present time. Of course this will mean that the Middle East will be more likely to explode than it has been at any time in the past. Naturally the ideal solution to this dilemma is to impose international supervision over the development of nuclear power in Israel so that the Arabs will not be forced to pursue the same path [that Israel has pursued]. But, ws we know, Israel so far has refused to go along with any type of international treaties concerning the non-proliferation of nuclear weapons.

The Second Interview

The second interview was held with Dr Daniel (Bogan). Here is its text:

[Question] What is the capacity of Iraq's nuclear reactor? How extensive was the damage which it suffered?

[Answer] It is not clear how much damage the nuclear reactor suffered. As for the power of the Osirak reactor, it undoubtedly uses large quantities of uranium. If these quantities of uranium are ignited again by means of the nuclear reactor or by means of what scientists call nuclear radiation, then the uranium and plutonium can be produced again.

[Question] Does Israel also have this same nuclear power?

[Answer] It is difficult to answer questions of this sort because countries are always careful not to reveal their nuclear capabilities. The Israelis obtained their Dimona nuclear reactor from France. It is widely suspected that they have also been able to obtain the equipment necessary to operate this reactor. But Israel has always stated that it will not be the first country of the Middle East to produce nuclear weapons. This is all the detailed information that we have concerning the Israeli nuclear program.

[Question] What about the other countries in the area?

[Answer] The only country that you can be sure has nuclear weapons is the one which has conducted tests with them. First of all, we have the five large countries which possess nuclear power. Then there is India which says that its nuclear power is for peaceful purposes. There is also Pakistan. However, many people ask what the difference is between peaceful purposes and military purposes when it comes to nuclear weapons. As for the Middle East, it is not possible to say more than what has been said because every country in the area refuses to discuss its nuclear capability. Furthermore, there is no information available concerning any tests conducted by the countries of the area.

[Question] What is the difference between peaceful purposes and military purposes in the use of nuclear power?

[Answer] It is not possible to distinguish very accurately between nuclear technology for peaceful purposes and nuclear technology for military purposes. The reason for this is that the process of nuclear fission which produces either nuclear weapons or nuclear power for peaceful purposes is the same process. If this process occurs at a certain speed, then uranium will be ignited and it will be possible to utilize the radiation for peaceful purposes. But if the process takes place at a greater speed, then this will lead toward a nuclear explosion which is considered to be the basis for nuclear military power. In short, when any country obtains information concerning nuclear power, this necessarily leads to becoming familiar with the manner in which nuclear weapons are produced. But this does not necessarily mean that a country which is pursuing a nuclear program for peaceful purposes is working on the production of nuclear weapons.

[Question] Does this mean that Iraq was capable of producing nuclear weapons?

[Answer] I am not able to say whether or not Iraq was capable of this. What I did say was that any country which obtains nuclear material and which comes to possess the capability of easily engaging in the operation of nuclear fission--which makes it possible to produce nuclear weapons--is closer to being able to produce nuclear weapons than other countries are. This is why the U.S. has been concerned about such advanced technology and such sensitive [nuclear] materials being in the Middle East.

[Question] Is there any feeling or apprehension that the Middle East is moving toward the likelihood of a nuclear confrontation?

[Answer] The countries of the Middle East right now are at different stages of development with regard to the possession of nuclear power. I feel that present-day indications are not encouraging. In fact I am very worried about the latest developments. The situation in the area has become much more unsettled than it was previously because of the introduction of (OTRAG) missiles into Libya, the Israeli bombing of the Iraqi nuclear reactor, the appearance of the Iraqi Osirak reactor, and because a number of countries in the area have refused to limit themselves to receiving smaller quantities of nuclear fuel. All of these developments have been increasing the danger of the situation in the area--an area which is basically one of the most dangerous areas in the world.

[Question] In your opinion, was it possible for the Iraqis to provide effective protection for their nuclear reactor?

[Answer] I do not know. I am not able to comment on this. I do not know what kind of protection you have in mind, and I do not know whether any kind of protection was possible.

9468
CSO: 5100/4739

ISRAEL

BRIEFS

YELLOW CAKE URANIUM PRODUCTION--Uranium production will start in the near future in a plant being established in the Rotem Plain, southeast of Beersheba. The uranium to be produced from phosphoric acid, will provide half of the fuel requirements for the nuclear electric power station of the type Israel plans to build, Negev Phosphates general manager Yosef Shalit told THE JERUSALEM POST yesterday. Negev Phosphates will produce the uranium--"yellowcake"--from phosphoric acid which is a product of phosphate ore. The price of such uranium ranges from $65 to $80 a kilogram. An interministerial committee is now discussing the problems involved in uranium production. The committee includes representatives of the Atomic Energy Committee, the Energy Ministry, the Dimona Nuclear Research Reactor and Negev Phosphates. The process by which uranium will be produced from phosphates is well-known and is used in a number of countries, including the United States. The amount of uranium yielded by this technique amounts to a half kilogram for every 1,000 kilograms of raw material. [Text] [TA161054 Jerusalem THE JERUSALEM POST in English 16 Jul 81 p 1]

CSO: 5100/4744

BRIEFS

FRENCH POLICY ON RSA--Lagos, 24 Jul (AFP)--In its Friday edition, the Nigerian DAILY TIMES writes in an editorial that the accession of Socialist to power in France created new hopes for a radical change in the French foreign policy. The paper adds that whatever future changes may occur, they will apparently not affect the traditional financial interests. In this regard, the editorial thinks that Mr Francois Mitterrand's stand on the development of South Africa's nuclear force should not be very surprising. According to the paper, a sudden breach of the agreement on nuclear cooperation with South Africa would seriously affect the French economy. The sale of nuclear technology to the RSA is not strictly an ordinary economic decision, for in the first place, the purchaser has resolutely refused to sign the Nuclear Nonproliferation Treaty, which France has signed. The paper adds that in the second place, the South African Government is a repressive one and cannot enjoy the support of the majority of the population, against whose interests its action is directly directed. This is why the DAILY TIMES says it would be surprised if the French Government granted its support to apartheid. On the contrary, the paper hopes that the Socialist president will not yield to the internal and external pressure if he takes his long-term political interests into consideration. [Text] [AB241927 Paris AFP in French 1529 GMT 24 Jul 81]

CSO: 5100/4950

BRIEFS

NEW NUCLEAR PROGRAMS BOARD--Minister of Manpower and Energy Affairs F.W. de Klerk has announced that Dr J.W.L. de Villiers, chairman of the Atomic Energy Board, will be the first chairman of the newly established corporative managing board which will combine the nuclear activities of the Uranium Enrichment Corporation (UCOR) and the Atomic Energy Board. Minister de Klerk said that Dr de Villiers will for the present be assisted by three others in preparing proposals on organizational procedures and legislation on the new arrangement. The three are Dr N. Stutterheim, former deputy chairman of CSIR [Council for Scientific and Industrial Research] and a chairman of the Association of Telephone Manufacturers of South Africa, member of the National Institute of Metallurgy, and director of Murray and Roberts Holdings, the South African Inventions Development Corporation, and SOEKOR; J.A. Stegmann, managing director of SASOL; and S.J.P. du Plessis, director general of mineral and energy affairs. Also, their appointment does not mean that they will take over responsibilities of the existing management of UCOR and the Atomic Energy Board or positions of present managers in the two corporations. [Text] [Capetown DIE BURGER in Afrikaans 27 Jul 81 p 9]

CSO: 5100/4951

FRG TO PROVIDE EGYPT WITH TWO NUCLEAR PLANTS

Berlin DER TAGESSPIEGEL in German 16 Jul 81 p 1

[Article: "Bonn Plans To Deliver Two Nuclear Energy Plants--Joint Political Declaration of Intentions Planned"]

[Text] Bonn--It is expected that the FRG will provide two nuclear energy plants to Egypt. Yesterday the Foreign Ministry confirmed that foreign ministers Genscher and Ali will shortly, each in his own capital, sign a "political declaration of intentions on cooperation in the peaceful use of nuclear energy."

According to the Foreign Ministry, this cooperation consists principally in the delivery of two nuclear power plants with a total capacity of up to 2,000 megawatts, not however including the so-called sensitive breeder reaction, meaning uranium enrichment and reprocessing. Additional information from the Ministry of Research and Technology indicates that the two reactors will be of the light water type.

In their declaration of intentions, both sides are to commit themselves to observe the provisions of the Nuclear Nonproliferation Treaty, as well as the rules of membership in the International Atomic Energy Organization. The nonproliferation treaty, of which both countries are members, provides for cooperation on the peaceful use of nuclear energy, insofar as inspections by the organization are accepted.

Between now and the year 2000 Egypt plans to build eight nuclear power plants for the production of its electric power. Delivery of two nuclear power plants each has already been agreed upon in contracts with the United States and France. The proposed German-Egyptian agreement constitutes the most extensive cooperative effort to date by the FRG with an Arab country in the peaceful use of nuclear energy. The FRG and Egypt have for some years had an agreement on scientific and technological cooperation which in the nuclear area concentrates mainly upon nuclear medicine and hydrobiology.

9273
CSO: 5200/2293

FRG CONFIRMS ILLEGAL FLUORINE PLANT DELIVERY TO PAKISTAN

Frankfurt FRANKFURTER RUNDSCHAU in German 16 Jul 81 p 2

[Text] Bonn, 15 July--The Freiburg engineering firm, CES Kalthof GmbH, in delivering a fluorine plant to Pakistan, has violated the FRG's export trade law, which requires issuance of an export license for exporting nuclear facilities. According to the Federal government's reply to an inquiry by SPD deputy Harald B. Schaefer last Wednesday, the export of this facility had not been approved in Bonn. Schaefer had referred to a report in STERN magazine, according to which the engineering firm had been a major supplier for construction of an atomic bomb in Pakistan.

An inspection of export activities of the firm by the FRG Ministry for Economics, conducted by the Freiburg inland revenue office, is said to have shown that a fluorine plant had been exported to Pakistan. This facility is said to be suitable for the production of uranium hexafluoride, a basic compound used in uranium enrichment. According to the STERN report, gasiform uranium hexafluoride can also be used for the production of U-235, as used in atomic bombs. Plans for the construction of the enrichment facility are said to have been stolen in Holland years ago; the uranium is said to have come from Niger.

9273
CSO: 5100/2293

PROBLEM OF NUCLEAR WASTE REPROCESSING ADDRESSED

Paris CEA NOTES D'INFORMATION in French May 81 pp 3-8

[Presentation given by Andre Gauvenet, main director of protection of Security of the Atomic Energy Commission, at "Nuclear Days," organized by the German Atom Forum on 22 March 1981 in Dusseldorf.]

[Excerpts] The problem of reprocessing was addressed in France as early as in the 1952 5-year plan. At that time the decision was made in France as elsewhere--it had been made somewhat earlier in the United Kingdom--to reprocess natural uranium-based fuel from graphite-gas reactors (Magnox type in Great Britain) in order to extract plutonium, a rich fissile material. At that time, there was in France no uranium isotope separation plant. In Great Britain, the existing plant was dedicated to serving the needs of the military.

Nuclear waste was certainly taken into consideration even at that time, and the Marcoule plant had the capability of storing fission products in double-walled stainless steel containers, as was done in Great Britain. Studies on vitrification of wastes began in 1967 at the Marcoule plant, upon the initiative of a St-Gobain/AEC (Atomic Energy Commission) team. Immersion in the ocean was being considered for low-level wastes. An immersion experiment was to take place in the Mediterrannean in 1961. It could not take place because of immediate opposition.

Reprocessing was therefore a well-established principle. The beginning of the fast-neutron reactor program (1957), the first signs of an important nuclear program (let us recall the report from the Euratom sages in 1957) confirmed this determination. Although significant, the French uranium reserves were considered insufficient to satisfy the needs of an important nuclear program. The development of the breeder, and therefore plutonium separation, seemed ultimately assured.

The problem of whether or not to reprocess nuclear waste has raised itself more acutely over the last few years, and particularly during President Carter's term of office. Every country has investigated this question, particularly within the scope of the INFCE [International Nuclear Fuel Cycle Evaluation]. I will not dwell upon the conclusions of this study which are well known: I will, however, mention that from the non-proliferation standpoint the pros and cons of the various nuclear fuel cycles, including the interrupted cycle (no-reprocessing), have seemed to be equivalent. The realization of the long term problems connected with reprocessing waste dates back from before the INFCE. It resulted in considerable activity, particularly on the international level. I will cite in particular the reports from the Nuclear Energy Agency of the OECO [Organization for Economic Cooperation and Development] and especially the latest one: the Polvani report. Although it can certainly be stated that, from the standpoint of safety, non-reprocessed irradiated fuels can be stored for long periods of time in acceptable conditions, it seems to us that storing wastes after reprocessing offers various advantages:

Without the presence of plutonium, radioactive isotopes present in the waste materials exhibit a specific radioactivity comparable to that in the earth's crust for activities of the same nature and the same importance. This admittedly approximate reasoning no longer holds when all the plutonium produced in the reactor is present in the waste. Furthermore, and this seems more important to me, burying irradiated fuel, even at great depths, constitutes a plutonium mine which could arouse greed. The problem of the security of long-term storage could thus become more acute, since intrusion in storage areas could no longer be considered fortuitous.

Considerations of this nature have led to the position taken in France, and have probably reinforced the position of specialists in other countries, especially in Europe. Having established this general principle, the French policy has developed progressively and pragmatically in a manner I will now describe.

General Problems and Regulation Problems

The principle of reprocessing, of the use of plutonium and the management of waste, having been established for many years, it is interesting to study first the regulation problems and the related technical/administrative measures.

Fuel reprocessing, processing, and waste storage centers have been authorized, since 1963, according to a very strict procedure. The organization concerned with waste and safety has been established progressively since that time. In 1963, the decree on Basic Nuclear Installations, which defines them and establishes the authorization procedure, was passed. This text has been somewhat modified 10 years later. It is very important to note that, within the scope of this regulation and above a certain threshhold which is almost always passed, waste storage and processing installations have been considered from the start as Basic Nuclear Installations and treated in the same strict manner as nuclear reactors or plants, which has not always been the case in other countries, where regulations and procedures were often less strict than in the case of power plants. Decisions were often made by local authorities rather than a more or less centralized one.

I remind you that the Central Office for the Safety of Nuclear Installations was created between 1972 and 1980. It was immediately involved in waste problems as a result of the decrees. The creation of the multi-ministry commission responsible for nuclear safety problems, and the creation within the AEC, in cooperation with the National Regulation Agency, of the Protection and Nuclear Safety Institute, followed. The ANDRA [National Agency for Managing Radioactive Waste], a state organization responsible for the management of radioactive wastes, was organized in 1979.

In France, there is no regulation or law forcing the owners of nuclear installations to provide facilities for the reprocessing and storage of wastes, or for the storage of irradiated fuel. Such laws exist in Sweden, Switzerland, and Germany. In France as in Great Britain, most owners of nuclear installations are public organizations, that is to say the government in an indirect manner. This fact is obviously taken into consideration in regulations. Safety organizations have partners which are not dispersed and are easy to control. In the case of nuclear power plants in particular, the Electricity of France, a state organization, is the sole owner.

In theory at least, there is nothing forcing producers to deliver their waste materials to ANDRA which, although it is responsible for the long term management, has no monopoly. This is due to the reasons explained above: the organizations involved are almost always public, if we set aside the small producers of wastes (hospitals, laboratores, etc). Considering the contractual relations which exist between the owners and the safety organizations, it is obvious that it is impossible to dispose of wastes in storage facilities without control. In the last 17 years, storage has been the object of a very strict procedure and, in most cases, there is no possibility of on-site storage for extended periods. These particularities therefore result in a de facto ANDRA monopoly.

These remarks are intended to underline the flexibility of French regulatory measures which sometimes prompt people outside of France to state that there are no nuclear laws in our country. Technically this is true but in fact, the existing regulations constitute an important body of texts which have the force of laws. It is a very flexible set of decrees and ordinances which are often considered within the framework of the existing laws. It is in fact a characteristic of the French system that in most cases, new regulations are molded within the framework of existing ones. This method has generally seemed simpler all along our legal history. Every ministry department has its own function that it has not seemed necessary to modify extensively. The gathering of protection and safety bodies within a single state organization has rarely been complete in those countries where it was attempted. In France, we deliberately took the opposite course by organizing an overall cooperation and by modifying, and sometimes adding to the existing structures by providing new texts.

Importance of the reprocessing and waste management problems in France [sic]. This importance results from the extent of the nuclear program: about five new power plants are started every year, and five are also completed every year, since we are now in an equilibrium period. The problem of waste storage and reprocessing is first of all a technical problem. The principles we are going to discuss can, in our opinion, give satisfactory solutions to the problems that exist, but it is also necessary to take into consideration the political and psychological problems. Psychologists believe that the word waste carries a negative connotation in the public's mind, and perhaps also in the minds of the responsible engineers. Naturally, these psychological problems have an influence on the time required to obtain approval on a site, once the technique has been established. These problems may even influence the choice between various options.

It has taken a long time for an awareness of these problems to take place. The question was certainly considered 10 to 12 years ago, but there was no real consciousness of the long term problems. It is true that the nuclear industry was not highly developed then. On the other hand, too often today there is a tendency to exaggerate certain problems. The technical community itself is not immune from these tendencies. We believe that it is absolutely necessary to place the problems of wastes in perspective and to address them by comparing them either with natural radiations, or with the waste problems arising from non-nuclear energy production methods (coal for instance).

Basic Principles of the French Policy on Waste Materials

They are not very different from those adopted in other countries, but a few characteristics related to the national policy should be noted.

Pre-Storage Operations

First of all, waste materials must be sorted at the production site. The first precept of the waste policy is that good quality sorting must take place. The operations which may take place are: a recycling of alpha radiators, volume reduction (in principle), waste processing, and finally conditioning, that is coating the waste materials and packing them in suitable containers. There must, of course, be some control at all stages.

The first of these operations takes place mostly at the production site itself. The last ones (coating and packing in containers) may take place at the storage site or in specialized centers.

Products not initially in solid form (for instance slurries) are always transformed into solids. Sorting assumes that the various categories of wastes are well-defined and particularly, that the threshold above which a product is considered radioactive be well defined. Sorting assumes the availability of methods of detection and control which are not always adequate at the present time, but are being perfected.

Storage

There are some well-known cases where the storage problem has been resolved, and others where it has not.

The objective of waste management is the storage of wastes in satisfactory conditions, but it can take several forms depending upon their nature. While the ultimate goal is permanent storage, it is possible and often necessary to go through temporary storage stages. Deep storage is planned for alpha wastes as for vitrified wastes. The storage depth may vary according to the level of radioactivity.

Category 1: "Beta-Gamma" Wastes Without Alpha Radiators

How can "no alpha" storage be defined? From the basic principles of our policy, by examining the storage sites and by studying the capacity of each site for beta-gammas and alphas. If a given site receives a majority of beta-gamma wastes with a maximum period of 30 years, it may be de-controlled after the active period, followed by a 200 to 300-year supervision period. The level of alpha radiation at the site should not prevent de-control.

Studies are therefore conducted for each site, so that de-control without reservation may be attained. This means that bulldozers may be put to work at the site to erect buildings or build roads, thus placing ground surface particles in suspension in the air. This also means that the flow of water should create no significant problem for the population. The studies thus determine the level above which a given waste material may be considered as containing alpha radiators. Below this level, it may be assumed that there are no alpha radiators in the wastes.

We now have a permanent storage site for beta-gamma radio-isotopes: the Channel site. Wastes are placed on the surface or under the surface at shallow depth. Clear specifications approved by the responsible safety organizations define the content of the blocs or drums as well as coatings and containers. The tolerated level of alpha products may depend somewhat upon the coating. A second site is being planned in the Forez region. In a first step, this site will be opened in a quarry located in the old Forez mine, managed until now by COGEMA [Nuclear Materials General Company]. This storage will be in an abandoned strip mine. The authorization procedure has now begun. A second phase being planned could result in storage in mine galeries, if results from the study are positive.

In the first case (storage in a quarry), the safety report is being studied. The study, which has almost been completed, should result in a determination of the maximum allowable level of alpha radiations. The same will happen for the second phase, where the two possibilities I mentioned earlier will be considered differently from the surface-storage case. The water problem remains just about the same, but at a depth of 50 meters, particles in suspension in the air are no longer a problem. The alpha level authorized by the safety organizations, based on ANDRA's proposal, will therefore be different. In this first category can be found preliminary storage sites at the production facilities. They may consist in storage sites used before departure to the permanent site, or holding sites used to allow a decrease in radioactivity in the case of short period products, in order to limit workers' exposure. Current problems are therefore: the determination of standards for each site, coating standards, and the preparation of procedures. Some of the problems have been resolved, others are still being studied.

Category 2: Low and Medium Level Alpha Radiators (Above the Threshold)

This category varies depending upon the threshold, since it may vary depending upon the site. The levels do not vary by considerable amounts, but it should be noted that the 30,000 to 70,000 m^3 which will be accumulated by the year 2000 are waste materials whose activity by volume is close to the thresholds which are generally considered. In other words, depending upon whether the threshold is high in a favorable site, or lower in a less favorable one, it will be possible to store wastes with higher or lower levels of alpha activity. As I mentioned, this threshold is dependent upon the nature of the coating, which gives additional flexibility. The particular case of irradiated wastes may create conditioning problems. It is not as easy to apply a coating to irradiated waste as non-irradiating waste, and it is not as easily transported.

At the present time, techniques are well known, and they are being perfected every day. The blocking factor is not the technique, but the site selection. There is still no permanent site for these types of wastes; all are stored temporarily at the production sites, and our policy is in selecting a number of these temporary centers, to pick those with the best capabilities, in order to consolidate these holding sites. They are planned for a determined duration of about 20 years.

Category 3: Highly Radioactive Wastes: 2000 m^3 in the Year 2000; This is Not a Large Volume

At the present time, the decision has been made in France to vitrify this type of waste material. This is a decision which has not been made elsewhere; others prefer to wait while hoping for a better process. It is currently being confirmed that vitrification is one of the best applicable processes, if not the best. Vitrified fission products are presently being stored on site at Marcoule, and the same will happen at the Hague where a vitrification facility is planned. Storage of this type of waste material is done in a very safe manner after the vitrified materials are cooled, and their volume is not large. The permanent solution is being studied as a choice between several possibilities. I will discuss the two main ones.

Waste materials may remain on the production site while the beta-gamma radiations decrease sufficiently. Beta-gamma radioactivity present some problems with respect to permanent storage, because the temperature reached by the glass may cause a reaction within the material, which is not the case for other types of wastes. This period of decrease in radioactivity and cooling may last several decades. But this waiting period could also take place on the permanent storage site, providing the wastes are cooled for an adequate period of time. Storage of these types of materials should be planned at depths of 500 to 1000 m. This question was the object of the Swedish safety report "KBS," which was a very valuable and original project. It describes deep storage of this type as possible so that no significant detrimental consequences for the environment may take place, particularly for the population, even in the distant future. As always for questions related to the nuclear industry, safety rests upon the existence of successive barriers blocking the spread of radioactivity to the environment, and therefore mankind. Artificial barriers (glass and container) last for a limited amount of time. On the other hand, geological barriers are active for a very long time. They include the materials placed around the containers, and the geology itself, including the depth effect. In the long term, there is a slow and controlled diffusion of the products, without significant consequences for the environment.

A well-known characteristic of radioactive products with a long period is that their specific activity is low, since at the atomic mass of radium or plutonium, this activity is inversely proportional to the period. This is the reason why permanent solutions may be found while respecting safety conditions. This peculiarity is not well known of the general public. After decrease in the beta-gamma radiation, the residual alpha radiation is in fact no higher than the natural radioactivity which may be found in the earth's crust. Therefore, after the few hundred years required for the beta-gamma radiations to decrease significantly, the level of alpha radiation is equivalent to the natural radiation in the earth's crust. This gives the scale of the problem. These principles must be applied in several steps, with the understanding that there is no need to rush to early implementation: it is desirable to benefit from scientific and technical breakthroughts which will not fail to take place in the future. On the other hand, it is essential to put together right now a complete file, including demonstrations and safety criteria, concerning the reference solution which, in France, consists in deep storage in granite formations. Such a demonstration implies:

1. Basic studies including in particular drillings down to 1000 m and studies of the rock formations encountered. The first drilling of this type was performed in 1980, and the corresponding studies are being completed now. A technical and economic study is being performed in order to chose between the various solutions described previously for the cooling of glass materials.

2. A storage demonstration which could take place within about 10 years.

3. A search for favorable sites which will follow the first two phases and should result in the selection of a site and the beginning of the corresponding administrative procedure.

At this stage, there will be nothing to prevent taking into consideration basic studies conducted in parallel, particularly within the scope of international cooperation, on rock formations other than granite (schiste, salt, clay, etc) and on storage on the ocean floor.

Observations Concerning the Principles Discussed

It is necessary to take into account at all times the total cost of waste management since the consideration of partial costs only could result in not undertaking necessary operations which would appear needlessly costly. This overall view of the economy of the wastes cycle seems very important to me.

An overall view has not always been taken in the past; this is the reason why the economic study was insufficient. It is also obvious that even now everything is not known and that it is necessary to make some approximations. It also seems important to make them right now. A method which does not seem interesting at the present time may become essential when the total cost, including anticipated cost of permanent and temporary storage, is taken into consideration. The recycling of alpha products I was talking about before and problems concerning incineration used to reduce the volume of the materials sometimes fall within this "economically incomplete" category. Another problem related to these financial calculations arises: where can the money for permanent storage be found?

For the more or less long term, the problem is somewhat like the retirement system where it is necessary to decide whether to operate with the capitalization method where money is set aside and invested, or with the distribution system. In France, from a practical standpoint, we have chosen the distribution system, which means that money is not set aside because of all the problems this implies, but money is collected either from the producers or from the government as it is needed. The long term will be treated in the same manner.

In all waste processing problems, it is necessary to pay careful attention to what some of us call the risk of breeding wastes. A given operation may seem very tempting, but it is possible that all the resulting wastes have not been anticipated initially. It is possible that while solving a solid waste disposal problem, liquid wastes may be produced in non-negligible quantities, which negates the advantages of the operation. It is extremely important to apply the "risk/benefit" study system officially promoted by many organizations, including the International Commission for Radiation Protection, to the problem of waste materials. It may happen that while reducing the amounts of radiation for the population, the amounts may be increased for workers. This is the case when waste materials are stored for extended periods at the production site. Considerations such as this may influence the choice.

As far as coating and conditioning of the waste materials is concerned, the management as well as ourselves require a standardization within the framework delineated by safety organizations and resulting in procedure books. This is dependent upon future storage, which means that a dialog takes place between producing and storing organizations, which is very important since some of the barriers (one or two in general) are the result of coating and processing before storage. As I mentioned, this requires an important and necessary link with the medium-term storage management. Finally, within this general framework, I would like to refer to the extreme interdependence of the various organizations. It is obvious that as far as waste problems are concerned, it is not possible to consider research and its application independently. Good coordination is necessary.

I would like to insist upon two points which have been mentioned previously. Whereas the problem of wastes does not now have a complete solution, it is nevertheless quite advanced technically. This conclusion has also been reached by the OECD, as well as by the DOE in the United States (a recent report by the DOE on the international status of the waste problem insists upon this point). As far as studies are concerned, two categories may be defined:

a. The problem of "artificial internal barriers," which is very important since, for a period of time, safety rests mainly upon the quality of the artificial barriers. These studies, and the establishment of procedure books is therefore quite important. At the AEC, we have a laboratory which may be used by all to study this problem. I have previously mentioned "artificial external barriers" which are placed around containers containing vitrified materials. We believe that these barriers should not be made up of precious metals (for instance titanium) or even only common metals such as copper, because of the risk of turning the storage site into a potential mine which may be the object of greed as would be the case if plutonium was not extracted.

b. As far as storage is concerned, many studies must be carried out. We have a program of studies followed by experimental evaluations of permanent solutions to high radioactivity problems, but the main problems are the psychological and political problems.

On the other hand, the studies I refer to are not only directed at geological storage solutions, but also other solutions which cannot be neglected such as ocean floor storage. For low-level radioactivity, waste immersion had been practiced in France several years ago. This solution may be excellent, and even better than surface storage from the standpoint of the optimization of the amounts of radiation in some cases.

Site studies have naturally been conducted in parallel with all these general studies. We must also insist upon the currently very fruitful international effort conducted by the International Atomic Energy Agency, the European Community, and the OECO through its Nuclear Agency. The last point I would like to raise is the necessity for conscious pragmatism in questions concerning waste materials: excessive rational thinking often takes precedence over experience. In my opinion, this pragmatism is the subject of objections from the public more than a prior rational thinking. A while ago I mentioned the problem of alpha thresholds. Wastes obviously fall into two categories of low and medium-level radioactivity, but if the question of thresholds, as determined for each site, is presented clearly, I believe the moving border between the two categories can be explained in a convincing manner.

6445
CSO: 5100/228

FUSION RESEARCH PROGRESS AT FONTENAY-AUX-ROSES

Paris LE MONDE in French 1 Jul 81 p 12

[Article by Jean-Francois Augereau: "Research on Thermonuclear Fusion: 20 million degrees at Fontenay-aux-Roses"]

[Text] A European team of physicists specialized in controlled thermonuclear fusion has succeeded in reaching a temperature of 20 million degrees, using the Tokamak installation at the Fontenay-aux-Roses Nuclear Studies Center. Although this may appear to the uninitiated as being less spectacular than the 60 million degrees obtained 3 years ago by an American team, it is nevertheless an important step in the control of fusion because of the conditions under which the experiment was conducted.

To create within a suitably selected medium--a deuterium and tritium plasma*--the conditions necessary to start and then sustain fusion of atom nuclei is not an easy enterprise. The plasma temperature must reach 100 million degrees, which creates serious confinement problems since a medium at such high temperature must not touch the physical walls of the equipment where it is located. Secondly, the temperature must be sustained for at least one second, and finally, the plasma density must reach 100,000 billion particles (ions) per cubic centimeter. None of the devices operating in the world today can achieve all three conditions simultaneously. Each has its own privileged area. Attempts are therefore being made to improve results, particularly in the area of plasma heating and the temperature reached in the confining cell. Four possibilities are available to scientists to reach their goal:

--The first, called resistive heating, consists in using the current present in the plasma in a tokamak. The plasma can provide energy to the electrons through the same mechanism--called Joule effect--as that used in heating the elements of an electric radiator. The electrons collide with ions, heating them and providing temperatures of about 10 million degrees.

--The second possibility is adiabatic compression. Briefly, it consists in suddenly increasing the magnetic field used to maintain the plasma at a sufficient distance from the walls of the device. There follows an extremely high compression of the plasma resulting in an increase in the temperature of the medium. This technique cannot easily be generally applied to large devices.

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*A plasma can be considered as a fourth state of matter where atom electrons and nuclei are separated and move around freely.

--The third possibility requires high speed injection of neutrons. To achieve this, hydrogen atoms are used since, being electrically neutral, they can traverse the confining magnetic field and penetrate to the heart of the plasma where they become ionized. Their kinetic energy is progressively transferred to the plasma, thus raising the temperature of the medium. This process, developed in the sixties and seventies, has allowed Princeton University scientists to reach more than 60 million degrees, but with a low plasma density.

--Finally, the fourth solution concerns radio-frequency heating of the plasma. It consists in introducing high frequency alternating currents within the plasma, with frequencies chosen according to the area where energy absorption will be the highest (resonance phenomenon). High quantities of energy can thus be transferred to the plasma.

It is in this latter area that the Fontenay-aux-Roses Tokamak team has recorded some brilliant results. Thanks to the combined efforts of the team scientists and technicians, and those of the engineers and technicians at Thomson-CSF, a high frequency heating system which has resulted in reaching 20 million degrees on 10 June 1981 was developed. This achievement is particularly important since it was obtained in plasma density conditions similar to those required in future fusion devices: 200,000 billion particles per cubic centimeter.

Work is continuing at Fontenay-aux-Roses, to complete the energy analysis of the plasma obtained and to evaluate the relative importance of the energy-loss mechanisms. The Joint European Torus (JET), a Tokamak the Europeans are building at Culham, in Great Britain, will be equipped with this system in its first operating phase*. At that time, around 1983, JET will be equipped with a resistive heating system plus an additional system providing 5 megawatts using neutral injection and 5 megawatts using a radiofrequency system. In the second step (1987-1988), this additional heating should be increased to 15 megawatts, but the contribution of the two techniques will only be determined as a function of experience obtained.

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*Power density will be less than in the Fontenay-aux-Roses Tokamak.

6445
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ECOLOGISTS RESUME SUPERPHENIX PROTEST: COST, SAFETY, NORMS

Paris LE MATIN in French 6 Jul 81 p 14

[Article by Jean-Louis Saux: "Ecologists Resume War Against Superphenix: 4 Years After the Anti-Nuclear War on the Creys-Malville Plant, They Confirm Their Opposition to the Breeder and Invite the Minister of Energy to Visit the Site"]

[Text] Four years after several tens of thousands of anti-nuclear protesters marched on the Creys-Malville plant, and as construction progresses inexorably at the breeder site, ecologists from the Isère region have decided to go to war against superphenix. The political environment has obviously changed and for the first time a delegation, including in particular the scientist authors of the book "Plutonium on the Rhône River" (LE MATIN, 12 March), was received by the management of Mersa Company, the builder of the plant. But the leaders of FRAPNA (Rhône-Alpes Federation for the Protection of Nature) wish to influence the decisions of the new government.

After meeting with Mersa management, only a few days after the second round of the legislative elections the leaders of FRAPNA, which includes about 50 different ecology groups in the Isère region alone, consider that the case put together by the GSIEN (Group of Scientists for Information on Nuclear Energy) and laid out in the book "Plutonium on the Rhône River" has been confirmed by information they have been able to gather. From this information, they consider that the 1976 safety report is totally outdated, considering the many modifications made to the project since that time.

The ecologists are also worried by the fact that the breeder reactor has been designed to withstand earthquakes ranging up to 7 on the Richter scale, whereas 2 level 8 tremors have occurred a few kilometers from this area in the last century. They also protest the fact that EDF (French National Electrical Company) is not respecting European standards since they plan to feed water at temperatures which could be as high as 34°C into the Rhône river. From the economic standpoint, the bill for Superphenix could reach 9 billion francs (about $15 million), and could reach 15 billion francs at the end of construction.

While the Socialist party is planning to set up a control commission charged with the responsibility to authorize the start-up of the plant, FRAPNA insists on stopping work immediately. With this objective in mind, they have invited Edmond Herve, the new Energy Minister, to go to Creys-Malville in July, and are demanding the creation of a regional information access commission. FRAPNA is also planning an information weekend in the fall, for the benefit of deputies from the Isère, and expresses astonishment that the new government is still seeking the advice of those who have led the French energy policy at all levels in the past.

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END

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 110

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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25 August 1981

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 110

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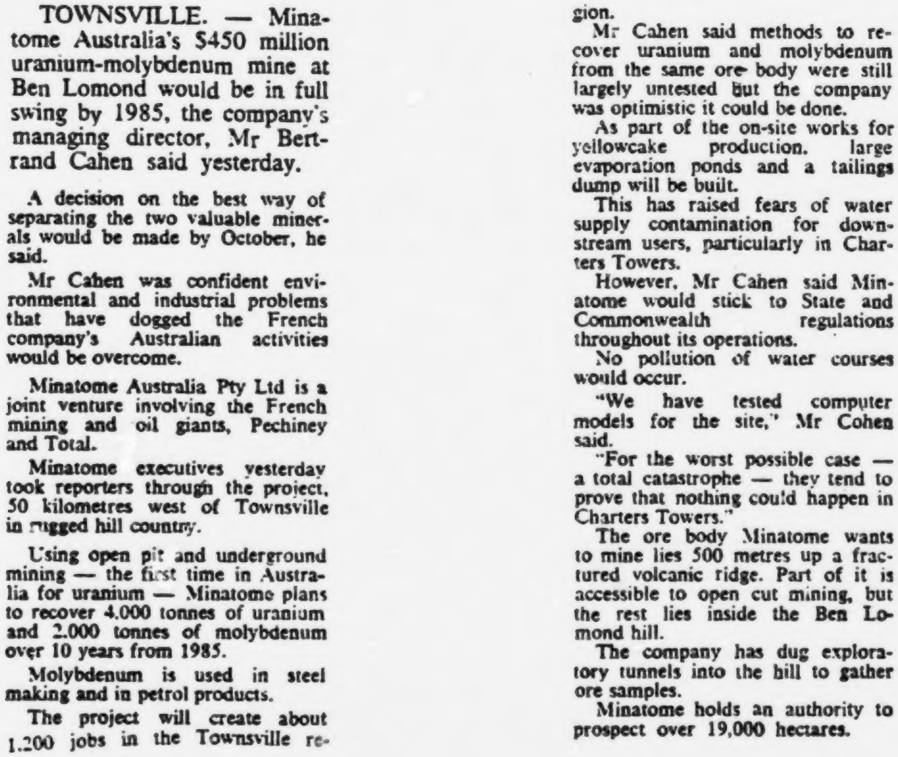
MINATOME MINE PROJECTS URANIUM PRODUCTION TO 1985

Sydney THE SYDNEY MORNING HERALD in English 9 Jul 81 p 19

[Article by Andrew Stone]

[Text]



TOWNSVILLE. — Minatome Australia's $450 million uranium-molybdenum mine at Ben Lomond would be in full swing by 1985, the company's managing director, Mr Bertrand Cahen said yesterday.

A decision on the best way of separating the two valuable minerals would be made by October, he said.

Mr Cahen was confident environmental and industrial problems that have dogged the French company's Australian activities would be overcome.

Minatome Australia Pty Ltd is a joint venture involving the French mining and oil giants, Pechiney and Total.

Minatome executives yesterday took reporters through the project, 50 kilometres west of Townsville in rugged hill country.

Using open pit and underground mining — the first time in Australia for uranium — Minatome plans to recover 4.000 tonnes of uranium and 2.000 tonnes of molybdenum over 10 years from 1985.

Molybdenum is used in steel making and in petrol products.

The project will create about 1.200 jobs in the Townsville region.

Mr Cahen said methods to recover uranium and molybdenum from the same ore body were still largely untested but the company was optimistic it could be done.

As part of the on-site works for yellowcake production. large evaporation ponds and a tailings dump will be built.

This has raised fears of water supply contamination for downstream users, particularly in Charters Towers.

However. Mr Cahen said Minatome would stick to State and Commonwealth regulations throughout its operations.

No pollution of water courses would occur.

"We have tested computer models for the site," Mr Cohen said.

"For the worst possible case — a total catastrophe — they tend to prove that nothing could happen in Charters Towers."

The ore body Minatome wants to mine lies 500 metres up a fractured volcanic ridge. Part of it is accessible to open cut mining, but the rest lies inside the Ben Lomond hill.

The company has dug exploratory tunnels into the hill to gather ore samples.

Minatome holds an authority to prospect over 19,000 hectares.

CSO: 5100/7550

YELLOWCAKE LEAVES DARWIN; UNIONS MOUNT PROTEST ACTION

Perth THE WEST AUSTRALIAN in English 11 Jul 81 p 27

[Text]

The barge sailed at noon with a $20 million cargo after loading from private waterfront land overnight.

As a protest, members of the Waterside Workers' Federation struck for 24 hours.

The Darwin branch secretary of the federation, Mr Brian Manning, said that the strike was a protest at the treatment of the Philippine-registered vessel, which entered the harbour without a pilot and for which other harbour regulations were broken or ignored.

The general manager of the port authority, Mr P. A. J. Warman, said that the Mayflower asked for a pilot, but the pilots had refused the job on advice from their union, the Merchant Service Guild.

The authority was considering what action it should take against the barge and the pilots.

The owner, master or agent of Mayflower could be fined a maximum of $100 for breaking regulations on pilots.

Yesterday's shipment of yellowcake was the first to leave the Northern Territory since members of the Seamen's Union applied its national ban on the product in April.

The police said yesterday that eight people arrested during a protest against the loading had been given bail and would appear in court next Wednesday.

In **CANBERRA,** the Acting Prime Minister, Mr Anthony, said that the shipment was taking place under procedures laid down by the Federal Government after its decision in 1977 to allow development of uranium mines in Australia.

CSO: 5100/7550

JAPAN READY FOR ROLE IN AUSTRALIAN URANIUM ENRICHMENT

Sydney THE SYDNEY MORNING HERALD in English 11 Jul 81 p 31

[Article by Hamish McDonald]

[Text] TOKYO, Friday. — Japan's nuclear power establishment is gearing up for a push to become the technology supplier for any Australian uranium enrichment industry that emerges later this decade.

With Australia's private consortium, the Uranium Enrichment Group of Australia (BHP, CRA, CSR, Western Mining), planning to choose a "preferred technology partner" by the end of this year before going on to a detailed feasibility study, Japan is stepping forward.

UEGA is looking to Europe also for potential partners, but Japan already has a long involvement. Prime Ministers Whitlam and Tanaka started a joint study in 1974, and after an apparently favourable first report, Prime Ministers Fraser and Ohira agreed to push on last year.

This week the Ministry of International Tade and Industry began its familiar "guidance" act. It approached the nine Japanese power utilities and nuclear engineering firms (Toshiba Corporation, Hitachi Ltd and Mitsubishi Heavy Industries are the most likely ones) to form a Japanese counterpart to UEGA.

The move came just after another signal of Japanese interest, in an important report on Japan's nuclear power program by MITI's special sub-committee on nuclear energy. On participation in the feasibility study with UEGA, the report states: "It is thought that participation in this study is meaningful from the aspect of harmonious Japan-Australia co-operative relations. In this feasibility study economic viability should be given full consideration."

Japan is now entirely dependent on uranium enriched in the United States, France and Britain, leaving Japan vulnerable to restrictions caused by changed non-proliferation policies among suppliers, and puts it in a weak market position when demand for enriched uranium tightens in future years.

Japan should therefore build an enrichment industry, using the centrifuge method already brought successfully to pilot operation at the Ningyo Toge plant of the Government's Power Reactor and Nuclear Fuel Development Corporation.

Australia is not alone in wanting to fill the Japanese demand for enriched product. The US under President Carter proposed that Japan enter a joint enrichment plant in the US. Last month the French-dominated European enrichment body Eurodif made a strong pitch to Prime Minister Suzuki- that buying more of its product would be an excellent way of reducing the Japan-Europe trade gap.

The advantage of an enrichment link with Japan, for Australia, is that the Australian industry would have close ties to what may be the only rapidly growing nuclear market left among the industrial giants (although anti-nuclear protest in Japan is growing fast).

And for Japan, Australia could be a useful market for its centrifuges. The MITI report emphasises that bringing the centrifuge to commercial production will be an expensive business requiring government help.

One factor in assessing profitability will be the unit cost of the centrifuges, the report notes. The limited size of the market created by the Japanese industry since the technology would have few applications in other fields. Could this be where Australia comes in?

CSO: 5100/7550

PAPER REPORTS PLANS FOR FIFTH ATOMIC POWER PLANT

Bombay THE TIMES OF INDIA in English 12 Jul 81 p 6

[Text]

NEW DELHI, July 11 (UNI): The fifth atomic power station to be located at Kakrapara in Surat district of Gujarat will finally have four reactors of 235-Mw each.

For the present, it has been decided by the department of atomic energy to commence construction of two reactors costing Rs. 382.52 crores. This includes about Rs. 6 crores for cooling towers. The foreign exchange component will be Rs. 34.77 crores.

The Kakrapara reactors will be of the CANDU type, that is natural uranium fuelled and heavy water moderated reactors incorporating the standardised basic design features of the Narora reactor, suitably adapted to local conditions.

The fuel, heavy water and technology for the proposed project will not be dependent on any outside agencies and the reactors will be outside the international safeguard restrictions.

The proposed project will meet the standard requirements for minimising environmental pollution.

URANIUM RESERVES

The fuel will be fabricated at the nuclear fuel complex, Hyderabad, which is being expanded in a phased manner to cater to this and future projects.

The proven reserves of uranium in the country are considered adequate to support the power programme as currently envisaged.

In the sixth plan provision has been made for commencing work on the construction of six such stations, which will raise the nuclear power generation capacity from the present 1,800 Mw to 3,210 Mw.

It has been decided to generally adopt the concept of a four-reactor station at all future sites to enable maximum utilisation of the site infrastructure.

The other four nuclear power stations are Tarapur near Bombay, Kalpakkam near Madras, Kota in Rajasthan and the Narora station in Uttar Pradesh.

CSO: 5100/7126

BRIEFS

SAHA INSTITUTE DIRECTOR--The governing panel of the Saha Institute of Nuclear Physics, at its meeting in Bombay on Tuesday, approved the appointment of Mr Manoj Kanti Banerjee, Head of the Department of Physics, University of Maryland, USA, as Director of the Institute for a five-year term. Mr Banerjee was Head of the Theoretical Physics Department of the institute till 1966. The Calcutta University Council and the West Bengal Government had already approved the appointment. Now the opinion of the department of Atomic Energy Commission is awaited. Mr R. K. Poddar, Vice-Chancellor, Calcutta University, who attended the Bombay meeting, said in Calcutta on Wednesday that the Centre's approval was expected as a matter of course, because the Centre was represented in the selection committee where the choice was unanimous. Mr Banerjee was among the 20 scholars who had earlier accepted the invitation to head the institute. He is expected to arrive in Calcutta in October, when he will deliver special lectures at the institute as a visiting professor. [Text] [Calcutta THE STATESMAN in English 9 Jul 81 p 12]

CSO: 5100/7125

BRIEFS

RADIATION LEAK AGAIN--Tokyo, July 20 (Reuter)--About a dozen workers were exposed to small, harmless amounts of radation [as printed] when radioactive waste water leaked at a nuclear power plant in central Japan today, a government spokesman said. A spokesman for the natural resources and energy agency said about one ton of concentrated waste water leaked from a storage tank through a faulty pipe at an underground unit but the liquid was automatically recovered and caused no contamination outside the building. He said about 12 workers received small amounts of radiation when they cleaned up the waste. But he described the doses as harmless. The plant at Hamaoka is operated by Chubu Electric Compaiy [as printed]. A company spokesman said operation at the 540,000-kilowatt boiling reactor was not affected by the incident. [Text] [Colombo SUN in English 21 Jul 81 p 5]

CSO: 5100/4913

DEVELOPMENT OF THERMONUCLEAR ENERGY DESCRIBED

Warsaw TRYBUNA LUDU in Polish 1 Jul 81 p 4

[Article by Doc Dr Michal Gryzinski, director of the Department of High-Temperature Plasma Physics at the Institute of Nuclear Research: "Besides the Tokamak there Is the Polish Way to Release Thermonuclear Energy"]

[Text] Various means for controlling the release of thermonuclear energy have been proposed during the last quarter century. Most of the proposals are based on the use of a magnetic field to contain a hot plasma. Up to the end of the 1960's and the beginning of the 1970's, the rapid release of thermonuclear energy in a highly concentrated, freely expanding plasma was not considered. With the development of the laser, however, this changed radically.

Then it became possible to heat a small sphere of thermonuclear fuel for a time measured in billionths of a second. Shortly after heating such a sphere, it was proposed to use intense electron beams and, finally, to use ion beams. The latter method, which has many advantages relative to the two previous ones, became possible when the so-called concept of selective magnetic insulation was experimentally verified. This concept is the basis for a new American research program which is based on the rapid heating of a small spherical mixture of deuterium and tritium with the aid of intensely focused streams of ions. The American scientists are forecasting the achievement via this method of the controlled relaase of thermonuclear energy within a couple of years.

The magnetic insulation concept is also the basis of our research program, and it also originated in Poland. It was formulated at the IBJ [Institute of Nuclear Research] in Swierk, where work is being conducted on conventional nuclear energy applications, at the end of the 1950's and beginning of the 1960's when work was also initiated on the controlled release of thermonuclear energy. At that time the subject was featured in scientific publications of the IBJ, which have worldwide distribution; later it was presented at the international conferences in Stockholm in 1967 and in Novosibirsk in 1968.

Based precisely on this concept and certain other original ideas, we were able to realize a unique thermonuclear experiment using relatively meager resources and to obtain results that opened the way to the next stage, that is to generate more energy during the termonuclear process than is required to create a hot plasma, after overcoming technical and technological difficulties as well as psychological resistance (resulting from disbelief in the reality of a program to generate a concentrated beam of ions having an intensity of several millions of amperes.

The basic results of the work conducted for many years was presented in a comprehensive way for the first time at the Seventh World Conference on Thermonuclear Synthesis in Austria in 1978. Now, results have been obtained that represent even a further advance forward and confirm our belief concerning the suitability of the road taken over 20 years ago.

The purpose of this article is to present the essence of the means that permit the creation of a superdense stream of ions, to present our method for the controlled release of thermonuclear energy, and to present the latest achievements in Swierk.

The Selective Insulation Concept

This concept, being the foundation for a new way to control the release of thermonuclear energy, is in essence quite simple. It is derived from the long-known fact that the radius of curvature of the trajectory of charged particles which are accelerated through an electric and magnetic field that are perpendicular to one another is proportional to the mass of the particles. The dimensions of the cycloid, for such is the trajectory of the particles if both fields are homogenous (that means they have a constant value over the entire region in which the particles move), will be proportional to the mass of the particles. This means that for a proton, the dimensions of the cycloid will be about 2,000 times greater than that for an electron.

Thus if we apply an appropriate voltage to be properly spaced, parallel, flat electrodes to create an electric field and pass the proper current through these electrodes to create a magnetic field, then a situation can be created such that the dimensions of the electron cycloid will be less than the interelectrode distance and electron current flow between the electrodes will not be possible, but the flow of positive ions (atomic nuclei) will occur almost without hinderance.

In this situation the introduction of an ionized gas between the electrodes will permit an efficient acceleration of ions while the additional current drain of the electric power supply will be insignificant (and not large as usually occurs). Thus it is an efficient way of generating an exceptionally intense stream of ions. It actually was this method that was the starting point of the thermonuclear experiments conducted in 1959 in Swierk.

Ion Implosion

Having discovered an efficient method of generating intense streams of ions, one could then think about releasing thermonuclear energy using nuclear collisions in forced streams of ions. For this method to be efficient, the product of the ion density of the stream and the linear dimensions defining the area of interaction of these streams should be appropriately large. To fulfill this condition, the scientists from Swierk proposed the concept of geometric focusing of ion streams, which is derived from the 19th century experiments with so-called duct radii. The essence of this concept is based on the creation of a centripetally directed stream of ions using perforated electrodes with appropriate recesses on their surfaces. To achieve an even greater degree of concentration of ions, the ions that have accumulated during the time the voltage is applied must be accelerated so that later-starting ions will have a higher velocity and will catch up with ions emitted earlier. With the application of a voltage that is appropriately time dependent, all particles will be able to be focused at the same time. The success of the entire undertaking, in which the amount of nuclear energy released during synthesis of deuterium and tritium nuclei will be greater than the energy needed to create this stream, will depend on the amount of ion current and the degree of ion concentration.

Realizing the Experiment

The simple estimation we conducted at the beginning of our experimental program led to the conclusion that even relatively small equipment can generate significant amounts of thermonuclear energy. For us this conclusion was very important because we were able to undertake a program that was directed directly to our goal despite relatively meager resources. Thus in 1959 we built equipment which we called the N-59 System (the origin of the letter N in the cryptonym is the word "neutron" inasmuch as in this equipment we wanted to obtain neutrons that were evidence of the nuclear derivation of the synthesis reactions). With the help of this equipment, we verified the magnetic-insulation concept and geometric-focusing concept. Unfortunately at that time we were not able to obtain neutrons.

It was not till February 1976 that we obtained the first neutrons, but today we are capable of generating several hundred million neutrons in a millionth of a second. More important, however, is that with a small device energized by several dozen thousand volts we were able to generate convergent streams of ions having currents exceeding 100,000 amperes and to concentrate this current in a space of several cubic centimeters.

This is a unique accomplishment on a worldwide scale. Heretofore, similar ion streams have been achieved only in the United States, but with a method requiring the use of potentials on the order of millions of volts which creates an entirely different scale of development problems.

Not too long ago a much larger thermonuclear research station was placed in operation which has an energizing current exceeding 1 million amperes (the SOWA-150 experiment) in which we hope to obtain much greater densities of ion streams and even still greater production of neutrons, and thus to release even greater amounts of nuclear synthesis energy.

We are thinking about building a system which would permit more thermonuclear energy to be achieved than is needed to generate and accelerate an ion stream.* It should be emphasized that a thermonuclear reactor based on ion implosion should be a simplier design, completely different from the complicated giant derived from the universally known Tokamak concept (meanwhile such components as superconductive windings and equipment to generate almost spacelike vacuums have become essential). There are reasons to believe that about the year 2000 a thermonuclear power plant based on the principle of burning thermonuclear fuel in a convergent stream of ions will be in operation.

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* In speaking of the results achieved by the IBJ team, the fact must not be forgotten that in 1961 the Military Technical Academy tackled the thermonuclear problem. This fact was immensely significant for the IBJ team since, as a result of the established collaboration, which was especially close during the initial period when the original thermonuclear experiment with the laser and plasma concentrator was conducted, the team was strengthened significantly, without which tackling such a program, whose goal was to go behond the required threshold, would have been at the least problematical.

11899
CSO:5100/3020

EDITORIAL VIEWS REAGAN'S NUCLEAR POLICY

PY111536 Rio de Janeiro JORNAL DO BRASIL in Portuguese 19 Jul 81 p 10

[Editorial: "Business Apart"]

[Text] President Ronald Reagan has just announced the basic points of his nuclear policy: for friends, everything; for lesser friends, the law, that is the Nuclear Nonproliferation Treaty (NPT).

Reagan's policy is like former President Carter's policy in that the signing of the NPT is the prerequisite for getting the benefits of technological transfer from the United States. It is not like Carter's policy in that whoever signs the NPT has the right to the technology of the breeder reactor, the one which enriches uranium and produces plutonium. And this is a crucial difference because the atomic bomb is made of plutonium, but President Reagan holds to the premise that whoever signed the NPT intends to use atomic energy for peaceful ends only. Therefore, no danger exists. (The question however cannot be reduced to such a simple aphorism, because Iraq signed the NPT and Israel swears that it was manufacturing a bomb in the now destroyed reactor).

Obviously President Reagan can still be accused of fomenting nuclear proliferation by all those who became suspicious--as Carter did--about the role of breeder reactors in the plans of countries which signed the NPT but which are not so trustworthy. Of course everything will depend on the safeguard system set up under the NPT. If it works, Reagan will not have lent a hand to proliferation. If the safeguard system does not work--as Israel believes it did not in the case of the Iraqi reactor--Reagan will in fact be expanding the capacity to manufacture bombs to all the countries with enough cash to buy a breeder reactor (or which thinks it has, as Brazil which has not bought a breeder reactor from the United States but is buying a yet untested system from the FRG).

The policy announced by Reagan has some useful lessons for Brazilians.

For instance, it should become clear that despite their patriotic wishful thinking some illustrious Brazilians were wrong in thinking that suddenly the Brazilian Government freed itself of an enemy (Carter) and gained a good friend (Reagan).

Reagan's nuclear policy demonstrates that he intends to be more flexible with his friends. But the United States is more friendly toward those countries which have initially accepted the NPT as an instrument to share nuclear technology over which the United States and the Soviet Union have predominance.

Therefore, some illustrious Brazilian should be reminded that Reagan and his friends may even harbor more fraternal sentiments toward Brazil than Carter did, but that, above all, Reagan is a friend of his friends. And the NPT is a valuable political umbrella to legitimate a commercial offensive against the Germans and the French who took great advantage of Carter's hard nuclear policy.

Another lesson to be drawn from Reagan's policy is learning what not to do. Brazil did not sign the NPT because it did not want to have its technological development restricted by an NPT smacking of a Tordesillas Treaty [treaty signed between Spain and Portugal in 1494 drawing a demarcation line for their land discoveries] drawn by the United States and the Soviet Union. Brazil made a political decision and acted with sovereignty. (Afterwards, Brazil was carried away by its ambitions in that area and embarked on an expensive and badly negotiated nuclear agreement which compromised the country's finances for many generations, to exploit a form of energy it does not need. If Brazil wanted to acquire nuclear technology, that's fine, but it did not have to spend so much money for that, because to ensure energy supply--which is what really matters--Brazil still has many less expensive alternatives. And hydroelectric energy is better business for us).

But what is at stake with the Reagan policy is the question of nuclear diplomacy. And here comes what we must not do: Embark on an anti-American offensive on the supposition that the Reagan policy keyed to the signing of the NPT is against Brazil. We have already been the victim of many misunderstandings in this area and the administration of it by former Foreign Minister Azeredo da Silveira was disastrous. The Carter government was particularly awkward with Brazil and Itamarty compounded that awkwardness.

Reagan drafted a policy that is convenient for him and for the signatories of the NPT. Brazil is not interested in the NPT or breeder reactors either. So let everyone look after himself the best way he can and let Reagan canvass purchase orders for his breeders. We down here will go on doing what we can to live with a megalomaniac nuclear program that only God knows how we will pay for.

CSO: 5100/2303

NO MORE DEADLINES FOR NUCLEAR PROGRAM, SAYS MINISTER

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 30 Jul 81 p 30

[Interview with Minister of Mines and Energy Cesar Cals by Paulo Andreoli, Jose Marcio Mendonca, Danubio Rodriguez and Fredy Krause of O ESTADO DE SAO PAULO; date and place not specified]

[Text] The Brazilian Nuclear Program will no longer have deadlines for its conclusion; it will progress at the rate required by the effective assimilation of technology. This is what is suggested by the statement of justification signed by Minister of Mines and Energy Cesar Cals, Minister of Planning Delfim Netto and Chief of the Military Household Danilo Venturini, which will be delivered to President Joao Figueiredo within a few days "as soon as he returns to Planalto." This, it was revealed by Minister Cesar Cals to ESTADO and JORNAL DA TARDE, is "something new already officialized." The minister explained the decision: "We no longer want the problem of deadlines to afflict us."

In a "frank conversation," Minister Cesar Cals also revealed that although at a slower rate, the Brazilian Nuclear Program will mean the construction "of a minimum of nine powerplants." One of them, said the minister, will be located in Ceara. Cals, refuting criticisms made of him because of his recent statements in Ceara, said that by announcing that the state will have "the largest nuclear complex in the world," he was referring to his plan to locate the largest unit for the production of uranium concentrates, a uranium hexafluoride (uranium gas) plant, an enrichment plant and a nuclear powerplant there for the generation of the power required for the enrichment process using the German technique of centrifugal jets.

"The Brazilian Nuclear Program is no longer justified by the need to provide electric power today," declared Minister Cesar Cals, acknowledging that present economic difficulties "influenced the preparation of the statement of justification to President Figueiredo but that was not the main reason."

Evidence

Evidence of the changes in the Brazilian Nuclear Program is the Angra I powerplant, which according to Minister Cesar Cals has only one deadline: "The deadline for the completion of Angra I is when it goes into operation. Why should we rush a powerplant, possibly affecting levels of safety or better operation levels?" The Angra I Westinghouse powerplant should be operating by the end of the year: "However, I have removed any fixed deadline."

Unhesitatingly, he also admitted that the problems with the foundations of Angra II were caused by haste and that the required prior geological studies were not made. It was another mishap for the minister: "This happens in the best families of England."

The minister of mines and energy, who for this "frank conversation" put aside his image of insecurity and weakness, talked seriously and with conviction, answering all questions asked of him. With respect to the alienation of the scientific community from the nuclear program, he replied: "Do you believe that the CNEN [National Nuclear Energy Commission] and NUCLEBRAS [Brazilian Nuclear Corporations] do not have scientists? What is the scientific community? Does this mean having a membership card? How does one join it? "

He admitted he is acquainted with the secret texts of the German-Brazilian agreement and said: "I am acquainted with some secret documents. However, I have not had much credence in secret texts since the Xerox machine. After all, which nuclear program does not have its secret clauses?"

"Despite Ueki"

Cals preferred not to talk about his image as a weak minister but responded indirectly to an insinuation about his scant power over the companies subordinated to his ministry. Questioned about NUCLEBRAS and its president, who refuses to talk to newsmen, the minister said: "The president of NUCLEBRAS is subordinate to a minister. This minister believed that in nuclear matters some things needed to be explained." Moreover, one of his advisers recalled later that the decision to import 750,000 barrels of petroleum was considered Utopian and innocuous. "Despite Ueki, Brazil is importing that much today."

Advisers to Cals also took it upon themselves to recall that the reduction in purchases of petroleum (from $12 billion to $10 billion this year) mean the end of speculations on the need for Brazil to resort to the IMF and it allowed the country to project a surplus in its trade balance this year. Another example of his "apparent weakness" is in nuclear policy: The president of NUCLEBRAS, Paulo Nogueira Batista, spoke of 40 nuclear powerplants by the year 2000. And the number of them did not increase over the nine originally scheduled. The minister does not speak about this. He only said: "When I arrived in the ministry I sought to put things in their place."

On the document prepared by nuclear physicist Jose Goldemberg at the request of Gen Danilo Venturini, Cesar Cals admitted that he was not acquainted with it but that this "paper" should contain suggestions which will be analyzed by the ministers who decide on nuclear matters. "Goldemberg was here drinking coffee this morning and Venturini did not know about it. There are no jealousies among us. The one who will decide is the president," he declared.

Energy Self-Sufficiency With Technological Autonomy

[Question] What is your opinion of the Brazilian Nuclear Program?

[Answer] I am fully convinced that with the petroleum crisis there was a movement of power in the world from the nations which had money to the nations which had energy. It is possible to have money and not be able to buy, as was shown by the petroleum embargoes. Energy technology is an instrument of the use of power. Therefore, the Brazilian energy policy is strongly based on the search for energy self-sufficiency with technological autonomy. Technology is the main point of our policy.

On the other hand, the energy balance of developed continental areas is negative with the exception of Russia. The energy balance of underdeveloped areas or those that are developing is positive. Therefore, we, the countries of the Third World, have a great opportunity of developing our technology because at this time other countries need energy and we can trade energy for technology.

[Question] When will nuclear energy be needed?

[Answer] In the case of electrical power, which is where nuclear energy will be used, our personal conviction is that the great Brazilian hydroelectric potential will be used up by the year 2000.

[Question] Brazil has, according to evaluations, 213 million hydroelectric kilowatts, of which 13 million come from the left bank of the Amazon. Therefore, we cannot count those 13 million for the market of the Southeast, which is the great Brazilian market. There are, therefore, 200 million, in broad numbers, in potentials of more than 10,000 kilowatts which are economically feasible. Two hundred million kilowatts of which nearly 50 percent are in the Amazon region.

The increase in Brazilian demand has been up to now, up to last year, around 12 percent per year, which means doubling the output every six years.

We are first going to talk about high demand and then about low demand.

No country in the world up to now has used 70 percent of its hydroelectric potential. Thus, 70 percent of 200 million is 140 million and Brazil has some other problems. In the Amazon region, where we have a great potential, the rivers are plains rivers. The addition of one meter to the dams floods great areas in which we have mineral and forestry reserves. Moreover, the construction of a transmission system in the middle of the jungle is not an easy task. Clearings are required and there are the Indian reservations. However, let us work with that 70 percent. On the basis of 12 percent increase per year with a high demand, we would have to double the potential every 6 years. Thirty million in 1980, 60 million in 1986 and 120 million in 1992. Therefore, 140 million would be needed by the year 2000. This also applies to a low demand because even if the rate of increase in demand were to decline, the electric potential would be completely used by the year 2000. To think that it is possible to fully supply the market of the Southeast with small hydroelectric powerplants of less than 10,000 kilowatts is absurd. The Southeast market today must be from 70 to 80 percent of those 30 million. They would be 24 million with a growth of 6 percent per year. Therefore, that type of multiplication would not work for that state.

[Question] By when would we have to assimilate nuclear technology?

[Answer] Then, with our hydroelectric potential completely in use by the year 2000, we believe that we have to learn the technology of energy sources by then. Energy sources for Brazil in the year 2000 in the electric energy sector will be basically coal and uranium. Brazil has large reserves of coal and enormous reserves of uranium.

The assimilation of technology means the planning, construction and operation of powerplants and also the construction of equipment in Brazil. It took Brazil 25 years to learn the technology of hydroelectricity. Therefore, the 20 years remaining until the year 2000 is not a very long time, particularly at another pace and in another degree of assimilation of technology. It is not a great deal of time in any country of the world. The normal period is 30 to 40 years.

We are preparing a coal program so as to learn the technology. There are 10 planned coal-fueled thermoelectic powerplants, two units of 300 megawatts each every two years, with a growing rate of nationally constructed parts: 60 percent in 1981 and we expect 70 percent in 1983 and so on.

[Questions] Is it necessary to build all those powerplants to learn the technology?

[Answer] The Nuclear Program for the learning of technology consists of the actual construction of nine nuclear powerplants. That is the minimum. There would be no investments in a factory for the manufacture of nuclear components if there were no program. The greatest madness is for a businessman to say that technology can be assimilated with the construction of only two nuclear powerplants. When I speak about learning technology, I am talking about manufacturing components in Brazil also. We do not want to depend on anyone.

[Question] It is worth remembering Professor Goldemberg, who said that China does not have any reactors but it knows nuclear technology.

[Answer] It does not know it. If it does not have one, it does not know it. When I wanted to construct a thermoelectric plant fueled by coal, the businessmen of ABDIB and ABIMAQ [Brazilian Association for the Development of Basic Industries and Brazilian Association of Machine Industries] asked me for a program. Obviously they are not going to spend money for equipment for their factory if they are only going to build two machines. They have to proceed with the improvement of the process. I will argue that with any manufacturer, just as I argued recently at the FIESP [Sao Paulo State Federation of Industries].

Returning, then, to the previous point, the nuclear program for learning technology consists of nine nuclear powerplants. One is of 630 megawatts, which should be in operation by the end of the year and with which we should learn the technology of operation. And there are eight other nuclear powerplants. By the end of the eighth, we shall be manufacturing 70 percent of the equipment in Brazil. It will not only be NUCLEP [Nuclebras Heavy Equipment, Inc], it will be national industry.

[Question] Does the fuel cycle not concern you?

[Answer] We wish to learn the nuclear fuel cycle. It begins with uranium concentrate. The first uranium plant is in Pocos de Caldas, uranium associated with molybdeuum and cobalt. The technology is French. The second powerplant will positively be in Ceara and we are going to show that when I declared that we would have the largest nuclear complex in the world there, I did not speak as a candidate for governor. I would not be that irresponsible. I am going to show what Ceara is, something you do not know in terms of uranium. And not even Professor Goldemberg knows. That second powerplant has uranium associated with phosphate. The technology to be used is being defined. At this moment, a group from NUCLEBRAS and PETROFERTIL [Brazilian Petroleum Corporation Fertilizers] is visiting some countries of the world where there is uranium associated with phosphate in order to define the technology to be used. The third plant will be fueled by uranium hexafluoride with national technology of the IPEN [Nuclear and Energy Research Institute]. We are going to buy a French plant because the learning of technology has no deadline and we need hexafluoride. But we are going to buy without technology so as not to contaminate our development. We shall make the enrichment of uranium in Ceara possible. The other phase consists of the manufacture of fuel elements. The factory is being started. We are going to buy zircalloy from Argentina because we also have the technology for making zircalloy pipes (fuel elements). They have to be of such a shape that they do not destroy the molecular structure of the zircalloy. The last phase means a plant for spent fuel, for the reprocessing of uranium, using German technology. Since we are going to manufacture plutonium, we shall need fast breeder reactors. Tomorrow (today) we shall sign a contract, that is, the CEN [Nuclear Energy Commission] will sign a contract with the Italian NIRA [Italian Nuclear Company for Advanced Reactors]. Finally, there is now a nuclear fusion program in which we are going to concentrate on the magnetic containment of Talcamag [expansion unknown].

When we have all these phases, all the links in the nuclear fuel cycle will be contracted, ready to learn, to assimilate technology.

[Question] And what are the deadlines?

[Answer] In a statement of justification to the president, which is already prepared and to be delivered soon, we made it clear that the nuclear program of nine powerplants will be completed and its rate will be in terms of the learning of technology. We do not want the problem of deadlines to afflict us. That is something new that has been made official. The ministers who signed the statement of justification were the minister of the National Security Council, the minister of mines and energy and the minister of the Planning Secretariat. That is, therefore, the nuclear program.

[Question] You proposed in your statement of justification that the deadlines established by policy should be the deadlines of the transfer of technology. How did you arrive at that conclusion?

[Answer] If we know that we have enough hydroelectric power to reach the year 2000 and that we are beginning a program for technology now, then the important thing is to assimilate technology.

[Question] But is there not also the problem of money?

[Answer] The problem of money may have some effect but it is not the most important.

[Question] You admit that the nuclear program was tied to the purchase of eight powerplants? Even German Minister Lambsdorf, when he came to Brazil, directly or indirectly said unless the eight are purchased, technology will not be forthcoming. Later he said that he had not said that. Is not the nuclear program somewhat tied to the problem of time and is that not the reason for the importance of your measure?

[Answer] That is true.

[Question] The impression one always had was that you did not know that General Venturini called Professor Goldemberg, that Professor Goldemberg has the mission of presenting written suggestions and sending them to Minister Venturini to be presented to President Figueiredo as contributions from the scientific community. As minister of mines and energy, were you or were you not informed of that?

[Answer] The nuclear policy in Brazil is by law or decree defined by three ministers, principally the secretary of the Security Council, who is Minister Danilo Venturini, the minister of mines and energy and the minister for foreign affairs. That does not mean that everything I do here I have to report to the other two. We only discuss what is important. The other day Professor Goldemberg had morning coffee with me here. My nuclear program was discussed at this table here by Goldemberg, by Hervasio de Carvalho and by Ivan Nascimento. I have received him in my house more than once. I knew that he had been with Venturini, but the report as far as I am concerned had no importance whatever. General Venturini did not know that Goldemberg was at my home. That document to which you refer is only a suggestion. To be put into practice it would have to be studied by the three ministers. We ministers are direct advisers to the president. He is the one who decides. If he orders one of the ministers to do this or that there must not be any jealousies. I am a frank man. I do not own the program. I do my part the best I can.

[Question] What role did the suggestions of the scientific community play in the statement of justification you took to the president?

[Answer] We have strongly advocated the problem of assimilation of nuclear technology ever since we came to the ministry. However, when the time comes to make the plan 2000 or when the time comes to transfer NUCON [NUCLEBRAS CONSTRUCTION, INC.] to SUMI [expansion unknown], some additional definitions will have to be made; some on rates, deadlines, and so forth. This was the moment to place this before President Figueiredo--something which was already a consensus. The nuclear program is no longer justified by the need for providing electrical energy today. The minister of mines and energy has been saying that since the day he came into the ministry.

[Question] Up to now you have spoken about the nuclear program simply analyzing it under the aspect of an energy policy. We would like for you to speak from the angle of national security and explain why that program, 6 or 7 years after being signed, still contains secret clauses?

[Answer] The nuclear program is for peaceful purposes. However, it has the energy sector, which is what is in my ministry. It has a very broad spectrum. I ask: What program does not have secret clauses? They are sometimes the clauses on the transfer of technology.

[Question] NUCLEBRAS does even more secret things. Paulo Nogueira Batista at no time tries to talk with newsmen.

[Answer] Look, the minister to whom Paulo is a subordinate called ESTADO because he saw that there was a need for explanations.

[Question] NUCLEBRAS President Paulo Nogueira Batista wanted to build 40 powerplants by the year 2000. The government reduced this number to nine. How was this done?

[Answer] There was a struggle between those who did not accept nuclear energy because they believed it was expensive and would harm the consumer--they favored dams--and those who believed that since it was a new technology it could become cheaper than hydroelectricity. Moreover, since it had a high voltage, it could have long transmission lines. That is why nuclear energy was to be the solution, even to the detriment of hydroelectric plants. I grew tired of hearing that tens of nuclear powerplants would be necessary in the short term. When I arrived at the ministry I tried to change things. First, there was no need for more energy supplies by the year 2000. There was a need for assimilation or learning a technology which would be widely used in the year 2000. The priority once more went to hydroelectric plants. There are nine programs for the assimilation of technology. We are going to have only nine. In the second place, it was necessary to do away with deadlines. What had been set for 1990 I postponed to 1995. That is what I just did with Angra I by removing any set deadline. The deadline is whenever it goes into operation. If it is for learning technology and we do not need electric power urgently, why are we going to hurry with a powerplant and maybe affect the levels of safety or the levels of better operations?

[Question] From what is known, Angra I is ready but there is no one with enough courage to press the button. Is that true?

[Answer] It is not true. Tests are continuing. I did away with deadlines and I set reasonable time periods. The Southeast does not need the power from Angra I at this time. We want it to operate with maximum safety; not only physical safety, for example, that there be no leaks, but reliability, that is, we do not want it to begin operations today and be down tomorrow. Moreover, many of the spares were used in tests and they must be imported. Would it be advantageous to place it in operation if it does have the stock of spare parts, at least the minimum it should have? What was happening was that newsmen with the best of intentions were setting deadlines for FURNAS [Brazilian Powerplants] and FURNAS was feverishly trying to meet them. I put an end to that. A deadline to me means an operation with safety and reliability.

[Question] At what stage is Angra I?

[Answer] There is nothing to hide. A nuclear powerplant begins to operate with tests, without a load. It generates electricity and the conventional parts are tested: turbines, generators, and so forth. Each of those circuits has to be licensed by the CNEN [National Nuclear Energy Commission]. In that phase it has the most important role. After the tests are made and the fuel has been obtained, the tests begin with a one-quarter load, then with a half load and so forth. When it is ready for loading, that will be D Day. Normally the critical test will be made in six weeks. However, if it takes seven, there is no problem.

[Question] You were not yet minister when we revealed that about the pilings of Udebrecht. The minister said that it was a fantasy, however, they are rebuilding the pilings right now. How are Angra II and III today?

[Answer] The pilings are being reinforced at Angra II and other pilings are being placed. Angra III will be built on solid rock without pilings.

[Question] That was a big "goof-up" was it not? In a country with so many specialists in the mechanics of soil no one knew that the Tupi-Guarani Indians called the beach at Angra "Itaorna," which means rotten rock.

[Answer] That is from the Dirceu Cardoso dictionary. That happens in the best families in England. But speaking seriously, there was only one problem. Because of trying to meet deadlines, all preliminary studies were not made.

[Question] Is that haste to accelerate the program going to end now?

[Answer] The agreement does not stipulate deadlines.

[Question] Then who makes the deadline?

[Answer] There is a commercial program. But there was no need to change that because of the statement of justification. The deadlines were mere reference points. There was no need to change any clauses.

[Question] What are the criticisms you consider fair about the nuclear program?

[Answer] The nuclear program is bad for those who do not have any idea that it is a technological need or for those who believe that the Brazilian hydroelectric potential is infinite. The nuclear program appears to be a program which demands great resources from a country which has a shortage of resources. But for a minister such as I, who is convinced that whoever does not learn the technology of its energy sources will be a dependent country,the nuclear program is a good program. If I believe that in the year 2000 the largest part of our electric power is going to be generated by coal and nuclear energy, it is obvious that I must seek to learn that technology by the year 2000. You cannot imagine what the struggle is like of a country that needs to be sovereign and needs to learn its technology. You cannot imagine how a state such as Ceara, in a nation as homogeneous as ours, suffers to carry out development programs. I say with all sincerity: When I was governor of Ceara, I began a program of planting coffee there. Sao Paulo newspapers criticized my program. They believed it was a risk. I had to reply that it was a risk to plant coffee where there was frost, and I had thousands of telegrams of protest from coffee growers of the southern part of the country. In the end it was successful.

[Question] How can the country learn technology, alienating the scientific community?

[Answer] Why scientific community? Do you believe that the CNEN and NUCLEBRAS do not have scientists? What is the scientific community? How does one join it?

[Question] What about the thorium group?

[Answer] Thorium has lost importance in Brazil because its reserves here are infinitely smaller than those of uranium. The technology of thorium is not known today, not even by the United States. That is the information I have. There was a time when uranium reserves were not known and thorium appeared to be the most important mineral. However, the thorium group is completely assimilated by NUCLEBRAS. It is not outside the program. The only thing is that it is not there as the thorium group.

[Question] Do you know the secret clauses of the Brazilian nuclear agreement?

[Answer] I know some secret documents. If not the secret clauses--I do not know. I am the person who uses the word confidential the least. After the invention of the Xerox machine I do not believe in the existence of anything confidential.

[Question] Who are the persons who today know all of the nuclear agreement?

[Answer] I believe that the National Security Council (of the Geisel and Figueiredo governments), the two ministers of mines and energy, the president of NUCLEBRAS and the president of the republic. I do not know if that is all of them.

In my opinion, it was a great accord. In order to transfer technology, four things are necessary: First, someone who has it; second, someone who wants it; third, someone who can receive it and fourth, someone who can pay. Our FURNAS personnel operated a nuclear powerplant in the United States with the best references possible. Our enrichment personnel dismantled a plant and assembled it here. They are prepared.

[Question] Mr Minister how is it that Ceara will have the largest nuclear complex in the world? Those statements by you were considered part of an electoral rhetoric made in Ceara for the people of Ceara alone. Do you agree?

[Answer] O ESTADO DE SAO PAULO does not know what was discovered in Ceara and it does not know what my plans are for the use of uranium reserves associated with phosphate located in that state. For these reasons the newspaper makes criticisms. It happens that in the region of Tataia in Ceara the mineralized area surveyed by RADAM [Amazon Radar] is immense. We are active in only 10 percent of it and that 10 percent is already one of the world's greatest reserves of uranium. It is estimated that there are 126,000 tons of uranium in Ceara alone. The area in which we are active is 10 percent of the mineralized area and that potential is surely greater than that. To have an idea in national terms, total reserves reach 230,000 tons and in Ceara alone there are 126,000 tons more.

[Question] How about in Amorinopolis, Goias?

[Answer] Sincerely, it is not a large reserve.

If we were to build a plant of 3,000 tons of uranium concentrate--that is a good amount--we would have 400,000 tons of phosphate per year as a byproduct. And PETROFERTIL tells me that it is the best phosphate in Brazil. We shall have a uranium concentrate plant for export, naturally. We are not going to think about keeping the uranium here if in 2040 we are going to be using hydrogen isotopes. I believe we should export uranium concentrate and enriched uranium.

We have, therefore, 400,000 tons of phosphate per year, which is phosphate not only for the entire Northeast but possibly also for exporting. To produce those 400,000 tons, 5,000 tons of sulphuric acid are required per day. For that amount the gypsum of Ceara, Rio Grande do Norte and Pernambuco is going to be used. This will produce limestone for cement and sulphuric acid as a byproduct.

We want to produce uranium concentrate with NUCLEBRAS, phosphate with PETROFERTIL and private enterprise and gypsum with cement companies. All that has already been initiated.

Strategically, the concept used at this time is that of not transporting much uranium. We would produce hexafluoride and do the enrichment there in Ceara. And if the energy that is going to be used is so much, possibly we will build a nuclear powerplant. I am explaining why I said it would be the largest complex. That is the opinion of TRICASTAN in France. It is better to do everything together than to transport materials from one place to the other. Today the largest uranium concentrate plant is one of 1,000 tons because there exists no concentrated reserve such as that of Ceara.

[Question] That nuclear powerplant that would be installed in Ceara, would it be exclusively for the generation of power for the enrichment process and so forth?

[Answer] It would serve for the process and a little would be left over for the economic system. That is only an idea which has not yet been studied in terms of viability. Viability ended at the 400,000 tons of phosphate to show that it is economically viable. We have two projects. One for uranium and one for phosphate, which are being made viable. We have the largest national reserve of uranium and best quality phosphate according to Belotti himself.

It is not, therefore, a difficult project to put into practice, even in terms of loans. We have phosphate fertilizer for making it viable and there are private business groups already who want to participate in that phosphate project.

[Question] But why did you not explain before why this would be the largest nuclear complex in the world?

[Answer] I already explained that in a technical meeting. What happened, however, was that the persons who were there were not "experts" on the subject. However, the statement was correct but I said it in INCEM [expansion unknown]. I am practically the only minister from the Northeast. Therefore I have to alert the businessmen of the Northeast to the fact that while they cannot participate directly in great projects such as that of Carajas or that uranium complex, they have the chance to create supplementary industries or make products for that great complex which is going to use brick, cement, iron, tiles and stone blocks. I have had meetings with businessmen to show them the great opportunities they will have to supply the large projects.

[Question] Will the Ceara powerplant be the fifth or the sixth?

[Answer] Four and five are in Sao Paulo.

[Question] That is a point that was not well explained.

[Answer] The headlines were what changed what had been said. I was having meetings with the companies. The question was asked about what the priorities would be. I told them what they were and on the part of NUCLEBRAS they were Angra II, III and possibly the beginning of a nuclear powerplant in Sao Paulo. It was not a collective news conference. I had to leave then. Later when I spoke at the Superior War School at which all accredited newsmen were present, I explained that the fault had not been that of the newsmen because their text was correct but the headlines distorted it. What I said was that we are not even going to begin construction. It will be only a site selection. The construction of the fourth nuclear plant will probably begin in 1983. However, we are already going to begin to collect materials for the initiation of components for Nuclear V.

8908
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STATUS, EXPENSES VERSUS PS NUCLEAR POLICY, PUBLIC DEBATE

Paris LE MATIN in French 1 Jul 81 p 16

[Text] No major decision will be made before a national debate is held. But EDF [French Electric Power Company] is continuing its work on the sites that the PS [Socialist Party] would like to "freeze." LE MATIN has prepared a list of the work and investments already done.

What happens after Plogoff? Both EDF and the public have questions about the future of the French nuclear power program which the new president and his majority party want to modify in favor of other energy sources. Francois Mitterrand has made it clear that the new energy plan should take into account the conclusions of the vast national debate that he wants to organize on this issue. The newly appointed secretary of state for energy, Edmond Herve, has been asked to make plans for this debate. No major decision will be made on nuclear power before it takes place, sources at the Elysee say. But the status of the work and investments made may carry more weight in the decisions to be made than the positions defended by the PS during the election campaign. For that reason, LE MATIN has prepared a chart for the seven nuclear sites most directly affected showing the status of the program designed by the previous administration for the 1990 horizon.

Since official word came that the Plogoff project was being halted, silence has once again enshrouded the French nuclear power program. On this issue there will be no more discordant notes issuing from the cabinet chorus. And the essential questions on this topic will remain unanswered until Francois Mitterrand's promise about a "vast debate on the energy future of France" is kept. Edmond Herve, the new secretary of state for energy, has been asked to make plans for this debate, and the plans could be made public before mid-July. On 3 June of this year, Francois Mitterrand gave the Mauroy government a 3-month period in which to prepare the new French energy plan, in light of this debate.

Until then, "no irreversible action will be taken, no major decision will be made" in the field of nuclear power, the Elysee says. So, give or take a few details, it is on the basis of what has been done so far that the government's decisions will be made. For that reason, LE MATIN questioned EDF about the exact status of the work, the expenses, and the orders made for the program set for the 1990 horizon.

In examining this status report, one thing becomes clear: the distinction made in the socialist program ("Energy: the Other Policy") between nuclear sites that are considered "open" and those considered "not open" today no longer corresponds to what actually exists in the field. The PS listed 13 "open" sites and 14 sites that were "not open."* But since the publication of the socialist "bible," EDF has continued its work, even working faster in some cases. So the question now is to determine at what point in the work and at what level of investments the site is considered to be "open." Take the Belleville site as an example. Over 4 billion francs have been spent for this site and an order has been signed for the boiler unit for the first unit of the complex. So can it still be classified as "not open"?

Inside the PS, the hardliners, close to the environmentalists, are holding firm. Paul Quiles, the PS national secretary, recently confirmed this position while speaking to representatives of environmental defense associations. This group is calling for a "freeze" of the 14 sites listed in the socialist program until the planned debate provides a basis for making a decision.

Another group, also basing its position on the outcome of this debate, wants only those sites where little work has been done to be frozen.

Considering the cancelation of Plogoff and the EDF schedule, only seven sites are really at issue here: Belleville, Cattenom, Chooz, Golfech, Le Pellerin, Nogent-sur-Seine, and Penly. And, considering the work and investments already involved, only three of these sites are completely or almost "untouched." They are: Chooz, Le Pellerin, and Golfech.

This situation will certainly carry heavy weight in the scheduled debate and will influence the decisions to be made. And these decisions do not affect only the way in which France will meet its energy requirements. In the short run, jobs and economic markets (provided by the large nuclear construction sites) are at stake. And finally, local elected officials will have their input to add.

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* Among these 14 sites, the public utility procedure has been completed for nine of them: Le Pellerin, Penly, Plogoff, Mayenne-sur-Seine, Golfech, Cattenom, Chooz, and Belleville. No firm decision has yet been made for the other five: Civaux, Saint-Etienne-des-Sorts, Port-la-Nouvelle, sites on the Allier, Adour, and the Saone rivers.

During the election campaign, the president clearly indicated that he was hostile to the "all nuclear" approach and that he favored an energy reconversion that would give more room to alternative energy approaches. In short, he supported a sort of "happy medium." It seems reasonable to assume that this position reflects in advance what the general public opinion in France will support in the future.

The Seven Power Plants Affected

I Belleville: four 1,300 MW units

a. Status of the work and expenses. The work in progress is for the first two units. The earthworks have been 94 percent completed (4 million cubic meters) and the civil engineering work is 30 percent completed. The money spent amounts to 4.1 billion francs, or 56 percent of the estimate. Contracts have been signed for the boiler for the first unit and for a traveling crane. There are now 900 people working at the site. 1,300 are planned for 1982, and 1,800 for 1983.

b. Scheduled date for start of service: first unit: June 1986; second unit: April 1987.

II Cattenom: four 1,300 MW units

a. Status of the work and expenses. Work on the first two units started in October 1978. The earthworks have been completed and 45 percent of the civil engineering is done. The two boilers were ordered in December 1979 and September 1980. There are 1,630 people employed at the site. Work on units 3 and 4 started in March 1981. The expenses involved to date come to 80 million francs; 130 people are working on this site.

b. Scheduled date for start of service: first unit: April 1985; second unit: January 1986.

III Chooz: four 1,300 MW units

a. The public utility declaration decree, signed by Andre Giraud, has still not been published. EDF is waiting for a possible "go-ahead" signal before acquiring land.

b. Scheduled date for start of service: first unit: April 1988; second unit: February 1989.

IV Golfech: four 1,300 MW units

a. EDF started the work in October 1980 in the aftermath of the public utility statement. Only the preliminary earthworks have been done. An access bridge and a side track for the railway are now under construction. The expenses involved are 33 million. There are 220 people working at the site.

b. Scheduled date for start of service: first unit: January 1988; second unit: November 1988.

V Nogent-sur-Seine: two 1,300 MW units

a. Work on the first unit started in April 1980. The preliminary earthworks have been completed (1,800,000 cubic meters of clearing) and the civil engineering is now being done. The expenses involved amount to 1.4 billion francs.

b. Scheduled date for start of service: first unit: January 1987; second unit: November 1987.

VI Le Pellerin: four 1,300 MW units

Plans are still being evaluated. No commitment has yet been made for 1982-83.

VII Penly: four 1,300 MW units

a. Work on the first unit started in April 1980. The preliminary earthworks have been completed (4 million cubic meters of clearing and 2 million cubic meters of fill; construction of a 680-meter dam). 80 percent of the work for connecting the railway line is done. 600 million francs have been spent; 610 people are employed at the site.

b. Scheduled date for start of service: first unit: September 1988.

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NUCLEAR SITE CONSTRUCTION FREEZE CREATING DISSENSION

Paris LE POINT in French 3 Aug 81 p 42

[Article by Roland Mihail: "Malcontents on Both Sides"]

> [Text] Five nuclear sites frozen; the moratorium that was decided upon on Thursday is far from unanimous. Among the defenders of nuclear power and among the ecologists.

Chooz, Golfech, Le Pellerin, Divaux, Cattenom 3 and 4, almost a half dozen nuclear sites stopped until after a debate scheduled for the autumn: this decision was taken on Thursday in the Council of Ministers.

The moratorium is not, as some were a little too quick to predict, a clear and sudden brake on the nuclear program. To be honest, this decision does not exactly conform, either, to Mitterrand's promises during his campaign.

Last January, in fact, the energy plan of the PS ("Energy: the Other Policy"), which was basically the work of Paul Quiles, a graduate of Paris Polytechnic, a former Shell engineer, was the subject of a public presentation. That project outlined the list of sites where the yards were not yet "open" and would therefore be "frozen" until after a real energy debate. In all, 14 sites were mentioned.

In June, after some pussyfooting by certain ministers, Francois Mitterrand decided to abandon Plogoff permanently. Since Thursday all the work on five other sites--among the most contested--is also frozen. But Nogent-sur-Seine, Belleville, Penly and Cattenom 1 and 2, which are considered "projects under way," are permanently escaping the knife. The official explanation: these power plants in which the work is to continue offer work at present on the premises to nearly 4,000 persons--to be 10,000 by 1983. And 16.6 billion Fr have already been committed there.

There remain the five sites that are being questioned. Eventual continuation--or permanent stoppage--now depends on the debate to be held in the fall in Parliament. Initially scheduled for the end of November, the Elysee hopes, they say, even to advance the date so it will take place on 15 October at the latest. On that parliamentary action, to which will be added discussions in the regional councils and television panels, France's new energy policy in effect depends.

However, the suspension of the work is going to stir up a great deal of opposition. First, from the ecologists: beginning Monday, the Friends of the Earth--Brice Lalonde's own group--have been taking a malicious pleasure in refreshing the foggy memory of the socialists. They have been asking without further ado for the total suspension of work on the 14 nuclear sites provided for by the Quiles project. "Only five sites is definitely treason. We have been cuckolded," one of Brice Lalonde's henchmen exclaims today.

And next, the opposition from those who place nuclear debate on the triple theme of employment, economic activity and energy independence. Already, on 2 July, called by the local CGT union, 1,000 workers from the Cattenom power plant were demonstrating at Thionville, demanding "the immediate continuation of the final sections 3 and 4." On 24 July the CGT again, but this time the confederal bureau, published a laconic but dry communique in which it said it believed "it would be regrettable and detrimental to slow down or stop the work in progress." On Wednesday, on the very eve of the Council of Ministers, when the fate of Cattenom and Nogent was still under discussion at the Energy Ministry, the possible announcement of the freeze on Nogent unleashed a chorus of protests from the 600 workmen there, and also from FO [Workers Force] members, RPR and UDF mayors, worried about more than 4 billion Fr in investments going up in smoke. The revolt was such that for two hours all the access roads to Troyes and Nogent were blocked by barriers. The same scenario on Friday in Dieppe, where the drivers of 100 excavators from the Penly site paraded--their horns jammed--to demonstrate against the threat of a potential blockage.

In reality, the power plant freeze decided upon on Thursday is in danger of bringing with chain reactions both financial and social. Of course, in Chooz as at Pellerin or Civaux, the work has not been started. But at Golfech, for example, the investments represent over 1 billion Fr. And nearly 200 jobs are threatened. The power plant was to create 650 jobs by 1982 and 1,100 by 1983. At Cattenom 1 and 2 there are 1,700 persons working permanently on the site. But to stop construction on the last two sections (3 and 4) would mean cancellation of 600 jobs between now and the end of the year. "How can all these workers be redeployed?" wonder now, privately, certain deputies from the districts concerned, who are today--an irony of fate--all socialists. A question they have broached with Edmond Herve, the new minister of Energy, at a luncheon on Tuesday 21 July.

A justified anxiety. Between the soft green promises made to the ecologists by Francois Mitterrand the the relentless will of the RPR, the UDF, the PCF, the FO and the CGT to defend the nuclear program, Edmond Herve will have to go ahead at any moment with acrobatic choices. At the risk of enduring from all sides--including in his own party--painful fallout.

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END

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 111

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NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 111

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BEHIND-THE-SCENES CONTROVERSY IN TARAPUR TALKS NOTED

Madras THE HINDU in English 24 Jul 81 p 9

[Text]

A bizarre controversy, which has been raging behind the scenes for some time between India and the U.S. over alleged preparation for another nuclear test, is likely to explode into an open wrangle if the forthcoming talks on Tarapur break down.

The U.S. continues to maintain that, both in terms of its domestic legislation and international obligations, it is perfectly justified in insisting on tighter safeguards as a sine qua non for the continuance of the fuel supply agreement.

It claims to have irrefutable evidence, supported by satellite pictures, of Indian preparations for another test at Pokhran. But India has denied that any such activity was under way since no decision had been taken to carry out one more nuclear explosion.

Routine digging

The alleged drilling at the test site spotted by the U.S. spy satellites relates to some routine digging by the army which has been using this desert area for years as an artillery firing range. But the U.S. has not accepted this explanation in the absence of adequate proof that India is not planning or preparing for another test explosion.

At one stage the U.S. had held out the hope that the pending second shipment of enriched uranium cleared by the former President, Mr. Jimmy Carter, would be despatched if the present Administration was able to certify that there had been no material change in the Indian position.

The intention then was to ship the 19.6 tonnes covered by this clearance as part of a terminal arrangement to enable India to gain some time for running Tarapur with an alternative mixed-oxide fuel, if a satisfactory accord was reached for continuing the existing safeguards in a mutually acceptable form.

The U.S. negotiators have been arguing in private conversations that they are bound by the promise given to Congress by the former Secretary of State, Mr. Edmund Muskie, to bring

Tarapur or obtain the pending shipment as part of a terminal arrangement.

The new nuclear policy line of the Reagan Administration offers no easy way out that would be equally acceptable to India and the U.S.

Element of bluff

There is an element of bluff in the U.S. bid to brow-beat India and it would call for considerable skill in resisting the pressures without exposing itself to the accusation that it is indirectly encouraging proliferation in the name of asserting the country's sovereign rights.

The strategy of the Indian negotiators is to let the U.S. first violate the Tarapur accord both in its letter and spirit before winding up the existing safeguards on spent fuel and installations.

It will be open to India to continue these safeguards, in a modified form, if it so chooses, so long as their retention is not part of a terminal arrangement.

The point that is being stressed is that, irrespective of what the U.S. does in repudiating its obligations, there will be no change in India's commitment to the cause of non-proliferation. The Government will, however, continue to exercise its discretion in conducting further tests, if necessary, for harnessing nuclear energy for peaceful purposes undeterred by international pressures.

It was officially announced today that a U.S. delegation led by the Assistant Secretary of State, Mr. James Malone, would be arriving in Delhi for talks on the Tarapur agreement.

to its notice any material change in the Indian position before despatching the pending shipment in due course.

They want a firm indication from India that it would not engage in another test before they can give this assurance to Congress in terms of Mr. Muskie's commitment.

Basic dispute

Though India has no intention of carrying out a new nuclear test in the near future, it sees no reason why it should hold out any such one-sided guarantee to a country that was bent on unilaterally repudiating a contractual obligation.

It wants the U.S. to continue to abide by the fuel supply agreement on the basis of the existing safeguards without imposing fresh conditions.

But this astonishing controversy over India's alleged intention to have another test is only an off-shoot of a more basic dispute over the continued validity of the fuel supply agreement.

At the forthcoming talks the main focus will be on the U.S. attempt to tighten the safeguards and India's refusal to comply with it.

It is highly unlikely that India would compromise its stand against any discriminatory safeguards either to secure an uninterrupted supply of fuel for

DOUBLE STANDARDS IN U.S. NUCLEAR AID POLICY ALLEGED

Madras THE HINDU in English 18 Jul 81 p 9

[Text]

WASHINGTON, July 17

The Reagan policy statement on nuclear "non-proliferation" was described by Senator John Glenn — the leading Congressional specialist on the subject and a man with a technologically-oriented vocabulary — as "boilerplate it is all so vaguely worded that it doesn't mean anything." Another member of Congress characterised it as "dangerous and contradictory."

Mr. Ronald Reagan's "policy framework", announced on Thursday, purports to have as its centrepiece "the need to prevent the spread of nuclear explosives to additional countries" and to "reduce the risks of nuclear proliferation." This, in fact, is said to be no less than "a fundamental national security and foreign policy objective."

Content-wise, the statement has no significant differences with the transition team report on "non-proliferation" co-authored by Mr James [illegible] Malone (and reported in detail in THE HINDU of April 15). Some of the rough or blatant features of that document have, of course been ironed out by those specialising, unlike Mr Malone, in diplomacy.

The new caste system that is being proposed in the international nuclear regime cannot escape the attention of those in India and elsewhere in developing countries interested in such matters. It is the prescription that one policy should be pursued for the developed countries (including such "honorary white" allies of the United States' as Japan and Israel) and wholly another for others.

'Policy of denial': For example, Mr Malone in his earlier report suggested winding down US attempts to "thwart civil, reprocessing programmes of several major industrailised nations" and blatantly advocated the application of "the policy of denial of US nuclear supply" to "countries posing a threat to US international security interests."

The just-announced Reagan policy framework commits the Administration not to "inhibit or set back civil reprocessing and breeder reactor developement abroad in nations with advanced nuclear power programmes where it does not constitute a proliferation risk."

Pressed on what exactly the last point meant, Reagan Administration officials (briefing the media in Washington) ruled India out of this application — saying the formulation would "probably" not apply to countries outside Europe (including the Soviet Union, of course) and Japan.

They underlined the two aspects of the formulation — in order not to attract opposition or undermining by the United States, a country would have to have an advanced "civil" nuclear power programme with a fast breeder reactor indicated "down the road" for legitimate energy security, secondly it should not constitute a "proliferation risk."

These two aspects should not be "separated", they warned, having already suggested (without saying so) that India was the very apotheosis of a proliferation risk.

'Continuity': For what it is worth, the Reagan policy framework is said to reflect "continuity" in US non-proliferation policy objectives for over three decades, with some "shifts" in emphasis especially from the Carter Administration's approach which is presented as hapless and bumbling.

The new policy is touted as placing greater emphasis on the need to "improve regional and global stability" and to "reduce motivations that can move countries toward nuclear explosives", on "international cooperation" as an essential part of "strengthening" the international non-proliferation regime and on the need to restore the US as a "reliable nuclear supplier" under an "effective regime of safeguards and non-proliferation controls."

Whereas Mr. Malone's initial

handiwork proposed eight "criteria" as the basis of Reagan Administration policy, the policy statement has seven "guidelines"

Security objective: First, the United States will "seek to prevent the spread of nuclear explosives to additional countries as a fundamental national security and foreign policy objective"

Secondly, it will "strive to reduce the motivation for acquiring nuclear explosives by working to improve regional and global stability and to promote understanding of the legitimate security concerns of other States"

(This appears mainly to be a reference to Pakistan and India, with the logic being that the interests not merely of regional stability but also of "non-proliferation" demand the rearming of the Pakistani military dictatorship on a significant scale)

Thirdly, the United States will "continue to support adherence" to the treaty on the non-proliferation of nuclear weapons and to the Tlatelolco treaty applicable to Latin America by countries that have not accepted these treaties

Directed at India: Fourthly, it will "view a material violation of these treaties or an international safeguards agreement as having profound consequences for international order' and United States bilateral relations, and also view any nuclear explosion by a non-nuclear-weapon State with grave concern" (The edge of this intimidatory guideline also seems to be directed at India)

Fifthly, it will "strongly support and continue to work with other nations to strengthen the International Atomic Energy Agency to provide for an improved international safeguards regime"

Sixthly, the United States will "seek to work more effectively with other countries to forge agreement on measures for combating the risks of proliferation"

Finally it will "continue to inhibit the transfer of sensitive nuclear material, equipment and technology, particularly where the danger of proliferation demands, and to seek agreement on requiring IAEA safeguards on all nuclear activities in a non-nuclear-weapon State as a condition for any significant new nuclear supply commitment"

India will particularly appreciate the irony of Mr Reagan setting forth in his statement of July 16 the need to "re establish this nation as a predictable and reliable partner for peaceful nuclear cooperation under adequate safeguards" — on the eve of Mr Malone's visit to India to formalise the liquidation of the Tarapur arrangement

FORMER OFFICIALS, DEFENSE EXPERT ADVOCATE NUCLEAR ARSENAL

New Delhi PATRIOT in English 18 Jul 81 p 5

[Text]

Former Air Chief Marshal P C Lal has said India, 'in effect,' has the atom bomb already and should integrate it into her military arsenal and build up her defence strategy and tactics around it, reports PTI.

For, he says in a magazine article, Pakistan's 'Islamic bomb' is neither a myth nor something in the distant future but 'is almost with us now.'

Writing in the journal, Mr Lal says by his estimate India has had the bomb—or at any rate the rudiments of one—since the May 1974 testing of a nuclear device at Pokhran in the Rajasthan deserts.

Mr Lal was chief of air staff until August 1973—just nine months before the bomb was imploded in Pokhran.

Mr Lal says calling the Pokhran explosion's purpose peaceful 'does not alter the fact that it could cause widespread destruction.'

Call it what you will, 'he observes,' that device was warlike in character.

'It stands to reason,' according to Mr Lal, 'that more work would have been done on it over the years, though none of it has been revealed to the public. It is possible that such improvements and refinements as were necessary have been made in the drawing office and the laboratory without going through the rigours of another full-scale test. Should that be so, then there could be a nuclear device in a fairly advanced state of development that could become India's bomb at short notice, if that were found necessary.'

Mr Lal says India cannot watch with equanimity Pakistan's nuclear weapon effort.

'So intense is the hostility in Pakistan against India that conflicts between them are inevitable,' he observes. 'The wars of 1948, 1965 and 1971, forced on India by other incidents testify to that. And yet, it is through such profitless confrontations that Pakistan justifies its existence and seeks to consolidate and unite its disparate people.'

Pakistan was geographically indefensible against India, was industrially, economically and politically weak. 'The advent of the Islamic bomb at a time like this could give Pakistan's rulers just that little extra confidence to launch yet another attack on India in order to establish themselves more firmly in positions of power.'

Mr Lal is of the view that the "ruling clique of Pakistan' will not hesitate to use the bomb and it has in the Mirage aircraft a convenient means of delivering it.

He advocates the upgrading of 'the embryo of a nuclear weapon system that we now possess' and produce and prove specific types of weapons for different kinds of carriers: Canberras, Jaguar, MiG-23 and satellite launch vehicle. The country must be made aware of what is being done and the armed forces trained for nuclear weapons.

India's defence budget may have to be increased twice or three times 'with a corresponding drain on the resources available for other essential activities,' he says. 'Pakistan's defence expenditure would soar in like fashion with even more drastic effects on its flimsy economy and political structure.'

KAUL'S VIEW

Former Foreign Secretary T N Kaul in another article in the same journal issue, says India did not go nuclear after the explosion of the first Chinese bomb in 1964 because of the death of Dr Homi Bhabha, the preoccupation of Dr Vikram Sarabhai with space research and satellites, and the opposition of Prime Minister Lal Bahadur Shastri to nuclear explosions.

Nothing positive was done to avert the nuclear threat from China by developing a deterrent nuclear capability of our own, Mr Kaul says.

Mrs Indira Gandhi launched a dynamic programme for research in peaceful nuclear explosions, but Mr Morarji Desai was against explosion of nuclear devices even for peaceful purposes. When she became Prime Minister again in 1980, Mrs Gandhi reverted to the policy of keeping India's option open.

After the series of Chinese explosions and the imminence of one by Pakistan, there could be no two opinions about the need of India to have a deterrent nuclear capability, Mr Kaul asserts.

Director of the Institute for Defence Studies and Analyses K Subrahmanyam says India really has no choice.

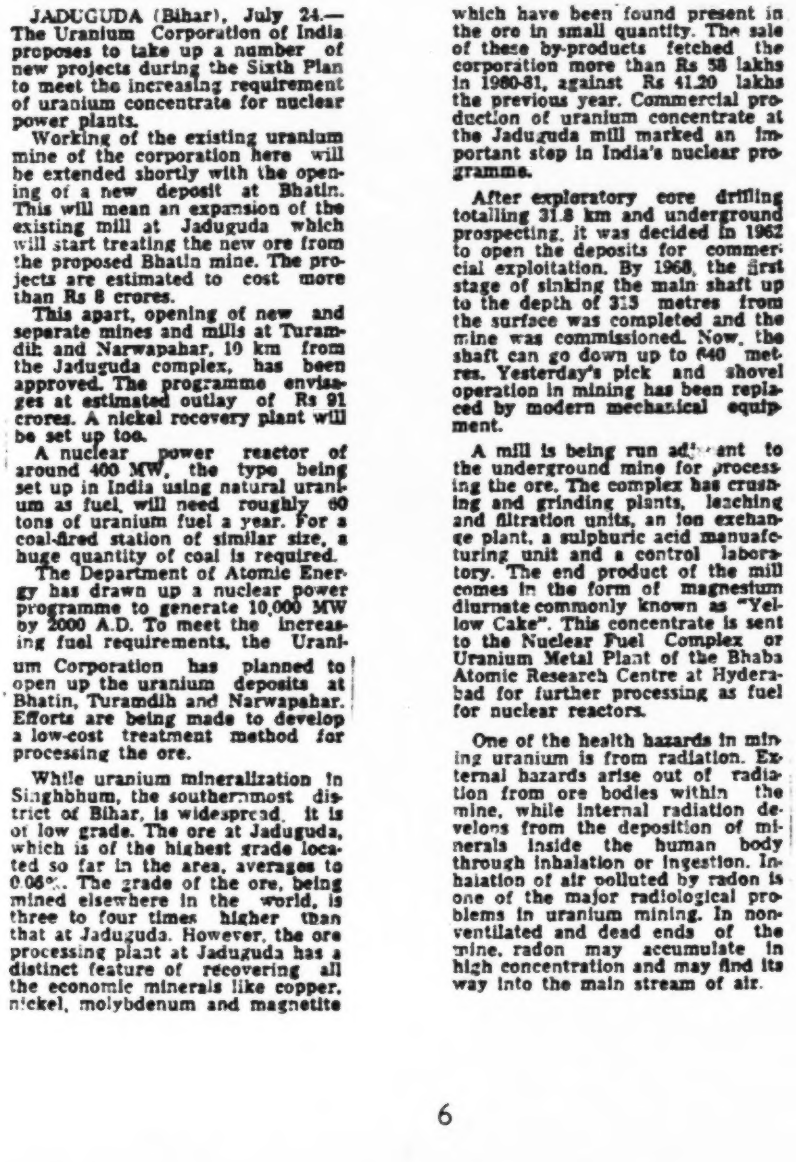
It is his opinion that India has to keep a few steps ahead of Pakistan in nuclear weapon technology and develop the infrastructure to be in a position to deter Pakistan when it reaches nuclear capability.

The only alternative was either to rely on external guarantees and sign away independence or to let the enemy overrun the country.

URANIUM CORPORATION OF INDIA PLANS NEW PROJECTS

Calcutta THE STATESMAN in English 25 Jul 81 p 7

[Text]



JADUGUDA (Bihar), July 24.—The Uranium Corporation of India proposes to take up a number of new projects during the Sixth Plan to meet the increasing requirement of uranium concentrate for nuclear power plants.

Working of the existing uranium mine of the corporation here will be extended shortly with the opening of a new deposit at Bhatin. This will mean an expansion of the existing mill at Jaduguda which will start treating the new ore from the proposed Bhatin mine. The projects are estimated to cost more than Rs 8 crores.

This apart, opening of new and seperate mines and mills at Turamdih and Narwapahar, 10 km from the Jaduguda complex, has been approved. The programme envisages at estimated outlay of Rs 91 crores. A nickel rocovery plant will be set up too.

A nuclear power reactor of around 400 MW, the type being set up in India using natural uranium as fuel, will need roughly 60 tons of uranium fuel a year. For a coal-fired station of similar size, a huge quantity of coal is required.

The Department of Atomic Energy has drawn up a nuclear power programme to generate 10,000 MW by 2000 A.D. To meet the increasing fuel requirements, the Uranium Corporation has planned to open up the uranium deposits at Bhatin, Turamdih and Narwapahar. Efforts are being made to develop a low-cost treatment method for processing the ore.

While uranium mineralization in Singhbhum, the southernmost district of Bihar, is widespread, it is of low grade. The ore at Jaduguda, which is of the highest grade located so far in the area, averages to 0.06%. The grade of the ore, being mined elsewhere in the world, is three to four times higher than that at Jaduguda. However, the ore processing plant at Jaduguda has a distinct feature of recovering all the economic minerals like copper, nickel, molybdenum and magnetite which have been found present in the ore in small quantity. The sale of these by-products fetched the corporation more than Rs 58 lakhs in 1980-81, against Rs 41.20 lakhs the previous year. Commercial production of uranium concentrate at the Jaduguda mill marked an important step in India's nuclear programme.

After exploratory core drilling totalling 31.8 km and underground prospecting, it was decided in 1962 to open the deposits for commercial exploitation. By 1968, the first stage of sinking the main shaft up to the depth of 315 metres from the surface was completed and the mine was commissioned. Now, the shaft can go down up to 640 metres. Yesterday's pick and shovel operation in mining has been replaced by modern mechanical equipment.

A mill is being run adjacent to the underground mine for processing the ore. The complex has crushing and grinding plants, leaching and filtration units, an ion exchange plant, a sulphuric acid manuafcturing unit and a control laboratory. The end product of the mill comes in the form of magnesium diurnate commonly known as "Yellow Cake". This concentrate is sent to the Nuclear Fuel Complex or Uranium Metal Plant of the Bhaba Atomic Research Centre at Hyderabad for further processing as fuel for nuclear reactors.

One of the health hazards in mining uranium is from radiation. External hazards arise out of radiation from ore bodies within the mine, while internal radiation develops from the deposition of minerals inside the human body through inhalation or ingestion. Inhalation of air polluted by radon is one of the major radiological problems in uranium mining. In non-ventilated and dead ends of the mine, radon may accumulate in high concentration and may find its way into the main stream of air.

BRIEFS

URANIUM IN MADHYA PRADESH--Calcutta, July 22 (UDI): Scientists of the Atomic Mineral Division (AMD) have struck uranium at the little known Darba area in Bastar district of Madhya Pradesh. This adds one more area to the country's atomic mineral map. The discovery of the mineral, needed for the nuclear power programme, at Dara has been described as "significant" by official sources here. The Department of Atomic Energy had undertaken drilling in Darba to assess the centralization of uranium, the sources added. [Text] [Bombay THE TIMES OF INDIA in English 23 Jul 81 p 5]

CSO: 5100

URANIUM SEAWATER EXTRACTION DEVELOPED

OW050557 Tokyo KYODO in English 0531 GMT 5 Aug 81

[Text] Tokyo, 5 Aug (KYODO)--Japan is developing a method of extracting uranium from the sea which scientists claim will be price-competitive with every other known form of energy resource.

A government test plant to extract uranium 233 and 235 from the Japanese Inland Sea, near the town of Nio on the Island of Shikoku, went into operation last month on a limited scale pending completion of construction.

Although on an extremely small scale so far, the operators, the governmental Metal Mining Agency, say the results so far indicate a Japanese-developed absorbent being used experimentally is far superior to anything now in operation in other countries.

Countries like Britain, France, West Germany and the United States have all been pursuing the goal of obtaining the virtually inexhaustible particles of uranium in sea water to compensate for the dwindling land-based supplies of the vital material for atomic energy.

Until now, West Germany has been regarded as being the front runner, with a pilot plant already in full operation. But researchers from governmental, academic and industrial laboratories collaborating on the Nio test plant now believe that Japan has some justification for claiming to be in the lead.

They are basing this claim on the fact that the Japanese method absorbs uranium 20 times more effectively than conventional equivalents already in existence.

The absorbent is a common sort of acrylic fiber combined with an amidoxime (amide being a class of crystalline compounds derived from ammonia) treated with alkali.

The governmental Industrial Research Institute, which headed the development team, says the material picked up 4 milligrams of uranium per 1 gram of absorbent after 10 days continuous immersion in the sea.

The institute says the best known conventional absorbent, using titanium oxide, gathered only 0.2 milligrams per 1 gram under equal conditions.

Hidetoshi Miyazaki, the institute's chief chemist, said extraction almost certainly could be boosted considerably if the absorbent was processed into netting or fabric form to increase the area of contact with the water.

Japan is giving the project top priority. It has no land-based uranium resources and so is totally dependent on imports. Government and industry are now cooperating in uranium exploration projects with several countries, primarily in West Africa.

Many experts, however, believe the world's land uranium resources could be exhausted by the end of the century in view of the growing pace of mining to meet the world's rapidly expanding need for nuclear energy as an alternative to oil.

By contrast, the uranium resources of the sea are roughtly estimated at about 4 billion tons. If all goes well with the current Nio model plant, the Metal Mining Agency hopes to see Japan's first practical uranium seawater extraction project underway by early 1990. The model plant itself will be in full operation by 1984.

Japanese research has been underway for the past 20 years. It has taken this long to reach the test extraction stage because of the many technical difficulties involved.

Although there is plenty of uranium in the sea it is obviously dispersed over a wide area and therefore is in only minute quantities at any one spot. Any extraction facility, therefore, must be on a large scale so as to be able to process the vast amounts of seawater needed.

To obtain only 3 grams of uranium for example, at least 1,000 tons of water is required. The Nio plant is on a modest scale and will only be able to produce about 10 kilograms of uranium oxide a year. Even for this, some yen 2.4 billion ($9.6 million) is needed for construction.

One of the big questions about seawater uranium extraction has been whether it is really economically viable. A resounding "yes" comes from Professor Masayoshi Sugano, a nuclear energy engineer at the University of Tokyo and head of a government committee overseeing development of the necessary technology.

He reckons that reclaiming uranium from the sea can definitely be competitive with land uranium mining, coal, and even the prospective development of fast breeder reactor nuclear power plants that not only keep themselves going, but produce surplus fuel.

While the new Japanese absorbent is being further tested, the Nio plant will use the existing already-proven titanium oxide-based technology. Water will be pumped from the sea into a tank with a floor covered with a material containing titanium hydroxide.

According to Professor Sugano, such a plant, assuming annual uranium output of 1,000 tons, could produce uranium oxide at a cost of $334 a pound. This assumes a uranium reclamation rate of 50 percent. If the size of the pump could be increased, the professor believes that a rate of 60 percent would mean production costs of $223 per pound and for 80 percent only $161 a pound.

Refined uranium ore (yellow cake) available to Japan from land-based mines recently has been priced at between $32 to $43 a pound. So, seawater uranium would be five to 10 times more expensive. But experts say that would still be a low production cost and would be competitive with the currently rising cost of coal, now being used more and more as a quick substitute for oil.

Professor Sugano says American studies reckon that at $150 a pound seawater uranium would be competitive with coal or fast breeder reactor. But they have so far reckoned on at least $1,400 per pound with existing technology.

If the Japanese figures are right--and he certainly believes they are--the nuclear energy expert says there could be a "seawater uranium boom" by 1995.

CSO: 5100/2309

NEW URANIUM DEPOSITS NOT TOP QUALITY

SK050620 Seoul CHOSON ILBO in Korean 5 Aug 81 p 1

[Text] The ROK Ministry of Energy and Resources on 4 August denied that the uranium deposits found in Pochon and Cholwon areas are of top quality.

The ministry said it reached this conclusion after making inquiries on the matter at the meeting held at the ministry with those involved in the uranium exploration. Staff of the Energy and Resources Research Institute, the Mining Industry Development Corporation, the Mining Industry Registration Office and the Yongpung Company reportedly met with officials of the Ministry of Energy and Resources.

However, the Mining Industry Registration Office still maintains that a survey of the areas conducted for the registration of mining zones has confirmed that the uranium deposits found in the areas contain 0.2 to 3.6 percent uranium.

The establishment of a mining zone is authorized if a survey of the surface of the prospective mine area confirms uranium ore content of greater than 0.02 percent uranium. A precision survey on the size of deposits and quality is normally conducted following the establishment of mining zones.

At present, 24 mining zones have been registered in the Pochon and Cholwon areas by the Yongpung Company and others. The registration of 26 other mining zones in the same area is being processed.

Meanwhile, for the present, the Mining Industry Development Corporation reportedly has no plan for precision exploration and drilling in the areas.

CSO: 5100/2309

EDITORIAL VIEWS DECISION ON NEUTRON BOMB

PY121956 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 11 Aug 81 p 3

[From "Notes and Information" page: "The Risks of a Decision"]

[Text] Ronald Reagan's decision to order the execution of the plan, partially abandoned by Carter in 1978, to manufacture the neutron bomb is evidence of the intensification of the superarms race beween the United States and the Soviet Union, and consequently of the worsening in the international situation. As can be remembered, nearly 3 years ago President Carter decided to temporarily suspend manufacture of the neutron bomb (dubbed "clean" wryly) and its subsequent positioning in European NATO bases. However, he made the length of the suspension conditional on the Soviet Union reaction. Carter deep down hoped that the Soviets would react to his "goodwill" gesture by reducing their conventional (Warsaw Pact tanks and aircrafts) and nuclear [SS-20 missiles targeted on the United States and medium range missiles aimed at strategic points in Western Europe) arsenals, thus relinquishing their superiority. Carter however maintained budgetary allocations for further development of the neutron bomb and missile-vehicles Lance and Sprint.

That typically Carter decision--typical in its hesitation--did not yield the expected reaction. The decision satisfied Soviet demands without receiving in return a similar goodwill gesture such as the slowdown in the superarms race and relinquishing the quest for military superiority (both conventional and nuclear)--a superiority which has become more obvious in the last 2 years. One can evaluate the seriousness of Reagan's decision in the light of such facts, a decision which reveals the U.S. determination to recover the strength seemingly lost through years of neglect and to secure a deterrent capability even at the cost of accelerating the arms race toward the absolute weapon. One can easily imagine that the Soviets--who responded to the U.S. moderation by intensifying their military preparedness--will not feel comfortable with Reagan's decision, more so when he speaks of recovering U.S. superiority although he would probably be content with real parity. One can easily predict that the Soviets will adopt measures not just to keep but to increase their edge in the production of weapons. Warnings to that effect are being heard more menacingly from Moscow.

The question is not the Soviet reaction, however, but the repercussions of Reagan's decision in European NATO circles, repercussions that are neither alike nor positive. The miliary imbalance which favored the Soviets in recent years increased Western Europe's fears of the Soviet threat. Fears have mounted to the point that, understandably but contradictorily, there are some who believe that the rearming of the West can precipitate a Soviet military reaction which will hit Europe first. This is why there are some who prefer the present situation although it means an increasing dependency on the Soviet Union. This way they can continue to live in a state of "Finlanditation." It is not difficult in this context to understand that the Reagan decision shifted to a critical point the relations not only with the Soviet Union but with the NATO countries as well.

The decision Carter adopted in 1978 caused profound disappointment and annoyance, especially in France and the FRG. France reacted proudly, in the spirit of Gen Charles de Gaulle's policy of grandeur. Giscard d'Estaing decided that his country would have the neutron bomb, and France has been manufacturing it since then. In 1978 the Germans felt greatly apprehensive about the prospects of their country being devastated by an aggression of the red army. They looked at the neutron bomb as a powerful tactical defensive weapon, capable of inflicting death but no destruction of buildings, machinery and vehicles; as a weapon capable of equalizing the 3-To1 tank and aircraft superiority of the Warsaw Pact. The Carter decision undermined FRG confidence in the guarantees and stability of U.S. diplomacy and, at that point, Bonn decided to reduce in its own way tensions with the Soviet bloc and to refrain from any measure which Moscow could consider provocative.

What the Germans fear most is the possibility of a double devastation; first by a Soviet offensive in the form of a blitzkrieg, and again by the U.S. liberating counteroffensive in a delayed and slow way. Incidentally, there are also Belgium's and the Netherland's reasons as well as those of increasingly pacifist groups in Italy and the FRG itself for refusing to accept the installation of U.S. Pershing and cruise missiles in their territory, although such missiles would be installed as a counterweight for the scores of medium range Soviet missiles which are already installed.

The risks implied in Reagan's decision are undeniably great. But the Soviets, who may also be wary of war, only understand the language of force. They certainly feel more respect for a strong adversary than for one who capitulates. From this perspective, Reagan's decision will likely lead to a clearcut understanding between the two superpowers.

CSO: 5100/2308

DAILY QUESTIONS HANDLING OF NEUTRON BOMB

PY131900 Rio de Janeiro JORNAL DO BRASIL in Portuguese 11 Aug 81 p 10

[Editorial: "Bomb and Politics"]

[Excerpts] The Reagan government's foreign policy has just made another unpredictable move, unpredictable and incomprehensible, by revealing the decision on the neutron bomb as a fait accompli.

Suddenly the neutron bomb is a fait accompli. This illustrates not only that the United States lacks or is late in working out a strategy not slanted to its confrontation with the Soviet Union, but also its indifference toward the rest of the world, including toward its natural allies. Worse yet, it serves to illustrate the lack of agreement within the U.S. Government itself as to what a more comprehensive strategy should be.

The question which became so obvious in Ottawa regarding economic matters is thus reinforced here in the diplomatic or strategic arena. The United States in Ottawa rejected any proposal to loosen its policy for the recovery of the dollar, even recognizing the negative effects of that policy on the world's economy. The United States sported an equally olympian attitude in the case of the neutron bomb. The reasons for such an attitude cannot be understood, considering that this bomb is tailor-made for the European theater. If the Europeans were against it before, they will be more so now that the bomb is imposed on them. What will become of NATO or other alliances if the Reagan Administration lapses into a nonchalance that is the antithesis of politics? Where does the Reagan government expect to find the allies it needs to carry out its singleminded tactic of confrontation with the Soviet Union?

CSO: 5100/2308

BRIEFS

FOREIGN MINISTER OPPOSES ARMS BUILDUP--Belo Horizonte (Brazil), 15 Aug (TELAM)--In the first official reaction to the U.S. decision to make the neutron bomb by the Brazilian Government, Foreign Minister Saraiva Guerreiro has said that he does not believe any form of useful, permanent cooperation can be based on threats of force. His statement was known here today upon publication of a speech he delivered last night at a seminar on foreign policy which is being held in this city, the capital of Minas Gerais state. "I do not believe excessive expenses on weapons with the pretext of seeking equilibrium will contribute to reducing tensions," Saraiva Guerreiro said. He added that Brazil does not accept the formation of blocs, axes, hegemonic principles, arms races, speculation over tensions and, in sum, everything that may result in the introduction into the continent of power plays and policies of dependence. [Text] [PY151856 Buenos Aires TELAM in Spanish 1520 GMT 15 Aug 81]

EDITORIAL SUPPORTS NEUTRON BOMB--At present the question of nuclear power seems to be reduced to some sort of accounting balance sheet between the United States and the Soviet Union. However, what should be of interest is the ratio of forces, so that the aggression capacity of the other side, and vice versa. Thus the U.S. neutron bomb is intended to offset the massive increase of Soviet military power, including the supposition that the neutron bomb is already part of the Soviet atomic arsenal. Reagan's strategy is based on the assumption that the Soviets could launch an attack on the European allies of the United States. In authorizing the manufacture of the neutron bomb, the U.S. intention is to dissuade the Soviets from launching that attack. Obviously the intention is not to attack the Soviet Union because, if it were so, the United States already has enough nuclear weapons. We are going through such a startling period of history that the only effective alternative to disarmament to ensure peace is the arms race which has been underway. It would be neither logical nor just to ask the leading power of Western democracy to deliberately condemn itself to lose that race. The cost of the race is exhorbitant and unjust, but there is no other alternative to defray its cost with resources more in keeping with the lofty spirit and destiny of the human race. [Excerpt] [PY150249 Rio de Janeiro O GLOBO in Portuguese 14 Aug 81 p 1]

NUCLEAR CONTRACT CANCEL ON ANGRA III--Rio de Janeiro--NUCON [Nuclebras Nuclear Plants Building Company] has canceled the contract with the Norberto Odebrecht Construction Company for the construction of the Angra III nuclear plant and decided to call for new bids, and to renegotiate the terms of the contract for Angra II, so as to force the company to maintain the timetable and the established prices. One of the measures adopted by NUCON to maintain the timetable and prices was changing the contracts with the Norberto Odebrecht Construction Company, which had been granted the construction of Angra II and Angra III, to those of the contract for the construction of Angra I, by decision of the then-Mines and Energy Minister Shigeaki Ueki. Thus, the revision of the terms of the contract with Norberto Odebrecht for Angra II seeks to concentrate the responsibilities of constructing companies exclusively on the civil construction of Angra II, adapting the terms of the contract to the obligations of respecting the timetable and prices agreed upon with NUCON. [Excerpts] [PY132338 Sao Paulo FOLHA DE SAO PAULO in Portuguese 1 Aug 81 p 14]

CSO: 5100/2309

MINOR PROBLEM REPORTED IN KOEBERG PLANT CONSTRUCTION

Cracks in Concrete

Johannesburg THE CITIZEN in English 15 Aug 81 p 4

[Text]

FINE cracks have appeared in the lower concrete raft supporting the Koeberg nuclear power plant at present under construction near Cape Town, the Minister of Mineral and Energy Affairs, Mr F W de Klerk said.

Replying to a question by Mr John Malcomess (PFP, Port Elizabeth Central), Mr De Klerk said such cracks were not unexpected in reinforced concrete structures of that size and the cracks were very small.

He said the cracks would not affect the operational safety of the plant.

Safety, Security Measures

Johannesburg THE CITIZEN in English 15 Aug 81 p 4

[Text]

THE Minister of Mineral and Energy Affairs, Mr F W de Klerk, yesterday gave an assurance that the planning of safety measures at the Koeberg power station was extremely effective, even when compared to the highest international standards.

He was asked during question time by Mr John Malcomess (PFP Port Elizabeth Central) whether the reactors at Koeberg would be able to withstand an attack designed to smash them by a hostile force.

"The risks attached to and consequences of hostile attacks on the Koeberg power station, together with measures to combat such attacks are matters which have been receiving careful attention since the planning stage of the Koeberg installation.

"These factors form an important part of the safety assessment conducted by the licensing branch of the Atomic Energy Board before a decision is made whether a licence should be granted for the operation of the plant and under what conditions such a licence should be issued.

"The assurance can be given that the planning of safety measures in respect of the Koeberg power station is "extremely effective, even when compared to the highest international standards.

"It would, however, not be in the national interest to disclosed the exact details of these security considerations," Mr De Klerk said.

CSO: 5100/4953

SOUTH AFRICA

SELF-SUFFICIENCY IN ENRICHED URANIUM POSSIBLE IN NEXT FEW YEARS

Johannesburg THE STAR in English 24 Jul 81 p 20

[Article by David Bamber]

[Text]

South Africa will be able to produce sufficient enriched uranium to supply the entire needs of the Koeberg power station within the next few years, said Dr Ampie Roux, chairman of the Uranium Enrichment Corporation.

Addressing an Associated Scientific and Technical Societies' lecture in Johannesburg, Dr Roux said, it was sad that a respected country such as the United States was prepared to go back on its word as regards the supply of the fuel to this country.

But perhaps, due to the takeover by the Reagan administration, the decision was not final "I only hope they will honour this contract."

Dr Roux noted that the Uranium Enrichment Corporation had struck up a couple of partnerships in the development of the enrichment plant at Pelindaba. These had all been terminated on economic or political grounds, he said.

The first partner had been a German company but after three years of collaboration, it was not prepared to "share the risk" in the building of the plant so South Africa had decided to "go it alone."

A second partner from a country which Dr Roux declined to name pulled out immediately after the riots broke out in Soweto in June, 1976.

In answer to a question, Dr Roux said reasonable demand for enriched uranium throughout the world was about 46 000 tons a year.

Current supply was about 49 000 tons so there would not be much scope for expansion of the market until nuclear programmes which had been temporarily suspended were revived. — David Bamber.

CSO: 5100/4953

PROSPECTS FOR URANIUM MARKET DISCUSSED

Johannesburg RAND DAILY MAIL in English 5 Aug 81 p 18

[Article by John Mulcahy]

[Text]

IT is widely accepted that even a sudden energy crisis is unlikely to boost nuclear fuel prices.

The London Mining Journal says a further weakening of the uranium spot market could occur if the climate for nuclear power does not improve and the oversupply situation persists for a long time.

The Journal believes most South African producers can probably cope with this event, but some of the older, higher-cost producers, whose output is sold under old contracts, may come under pressure and fall by the wayside.

Most South Africn uranium plants are fairly modern with efficient facilities unlikely to become subject to severe cost pressures unless a further fall in the gold price renders some reefs unpayable.

Commercial stockpiles of uranium stand at about 100 000 tons of metal and are expected to rise to 110 000 tons by 1985 before starting to decline.

Uranium demand is still growing, but only at a marginal rate, with nuclear programmes revised in many countries in the aftermath of Three Mile Island (TMI).

The US has reassessed its nuclear power programme and a moratorium on licensing reactors is estimated to have set back the US nuclear industry by at least two years.

Africa accounts for about 40% of Western world production of uranium, with South West Africa and South Africa responsible for two-thirds of Africa's output.

South West Africa's only producer, Rossing Uranium, reached full production in 1979. Its uranium output has risen from nothing to 5 000 tons a year in a few years.

According to the Mining Journal, South Africa, more than any other producer, took advantage of the boom conditions of the 1970s, securing long-term contracts and investing heavily in new projects.

Within the past few years large plants have been commissioned by Ergo (280 tons uranium oxide a year), the Joint Metallurgical Scheme in the Free State — 850 tons a year; Southvaal — 750 tons a year; Randfontein — 600 tons a year; Chemwes — 680 tons a year; and Harmony.

All these projects brought about a rapid increase in output, which rose by 22% in 1979 and by a further 28% last year to 7 109 tons of uranium oxide.

A further increase is likely within the next two years as several other major projects come on stream, including Gencor's Beisa mine in the Free State, Rand Mines dump treatment project, and the Middle Elsburg uranium project at Western Areas.

The Journal believes these plans and projects are an indication that South Africa has the ability to produce uranium at a low cost.

"Even in the current (and forecast) climate of oversupply, Nufcor (which negotiates on behalf of all producers) is still able to secure contract terms that are acceptable and, in essence, this must signify that they can accept lower prices than producers in many other parts of the world."

Nufcor's success also reflects South Africa's reputation as a reliable long-term supplier of quality product

It is estimated that nearly 90% of South Africa's known uranium resources occur within the gold-bearing conglomerates of the Witwatersrand Basin, and because most of the uranium is recovered as a by-product of gold mining, producers are generally far less sensitive to fluctuations in the uranium market than are many primary producers elsewhere.

Most of South Africa's uranium is sold on a long-term contractual basis, and the balance is periodically sold on the spot market.

As a result of by-production, lower spot prices can either be accepted by producers; or as most have substantial gold earnings to cushion the worst effects of fluctuating uranium prices, avoided.

In 1980 the record gold profits earned by most of the by-product uranium producers substantially exceeded uranium profits, and most producers were able to absorb the cost of stockpiling excess uranium instead of selling it at an unfavourable price.

However, in 1981 it has been less economical to stockpile because gold profits have in most cases tumbled.

Many producers have become unwilling to incur the cost of stockpiling and approaches have been made to the Government to fund a national stockpile of uranium when prices are unfavourable.

Several South African producers have been obliged to reconsider their uranium operations in the light of current price and market forecasts, and the emergence of a buyers' market has enabled many customers to put pressure on producers to modify contract terms.

This has been a particular problem for primary producers, with no gold profits to cushion them from low uranium prices, and producers whose output is tied to older contracts at lower prices.

CSO: 5100/4953

WEST GERMAN FIRM TO START URANIUM PROSPECTING

Lusaka SUNDAY TIMES in English 9 Aug 81 p 7

[Text]

A WEST German firm has started ground prospecting for uranium on the Copperbelt and other parts of the country.

Saarberg Interplan Company has also entered into an agreement with the Ministry of Mines for joint coal prospecting in Zambia.

Announcing the beginning of operations the spokesman said magnetic airborne survey over the Zimbabwean part of the Zambezi valley, adjacent to Saarberg Interplan's Siavonga and Feira licences was underway.

The spokesman said his company's prospecting and investment strategy stipulated an expansion programme during which the search for uranium deposits would be intensified throughout the country.

The West German Foundation for Technical Cooperation will send two Saarberg Interplan geologists to Zambia soon who would undertake a pre-feasibility study for coal prospecting in the Western Province.

Zambia army is understood to have promised to clear landmines and grade the Feira area soon to facilitate the uranium exploitation programme in the entire Zambezi valley.

The company is licenced to prospect for uranium in the Siavonga, Luangwa, Copperbelt, Central and North Western provinces.

Ground prospecting operations are scheduled to start in Siavonga this year after the completion of the grading exercise. After this actual drilling operations would start.

Anticipated

Last April Minister of Mines Mr Mufaya Mumbuna said the West Germany minerals firm would spend more than K5 million in prospecting for uranium.

Speaking during the signing of the agreement between his ministry and the firm the minister said it was anticipated that the company's prospecting exercise would be spread over three years after which they would advise the Government on the potential of the uranium deposits.

The Government has signed an agreement with Agip of Italy which in conjunction with Cogema of France has joined the uranium mining operations.

Referring to his company's involvement in uranium mining a Saarberg Interplan spokesman said apart from three foreign experts his company had engaged 20 field assistants and would shortly recruit three mining graduates from the University of Zambia for the project.

CSO: 5100/4954

FRG, CANADA CONSIDER COMBINED NUCLEAR SALES TO THIRD WORLD

Bonn DIE WELT in German 20 Jul 81 p 3

[Article by Peter Gillies: "Joint Sales of Nuclear Technology--Schmidt and Trudeau Agree On Guidelines for Third World Exports"]

[Text] Ottawa--Canada and the FRG are planning a cooperative effort for selling nuclear technology to Third World countries. Federal Chancellor Helmut Schmidt and Canadian Prime Minister Pierre Elliot Trudeau agreed in Ottawa on a set of guidelines for this purpose. The country, which is exceptionally rich in raw materials, plans a major effort to attract German investors.

Schmidt and Trudeau met for a bilateral exchange of views just prior to the Seventh World Economic Summit Conference. Members of the German delegation indicated that the negotiations proceeded in an "excellent and unusually cordial" manner.

What Measures

This was particularly true of political consultations, while economic cooperation was not entirely without problems. Trudeau and Schmidt, personal friends and sailing enthusiasts both, tried to arrive at measures to be taken by their governments to make economic cooperation as frictionless as their political relations. The results of these talks was the agreement about joint activities in the area of nuclear technology. It was announced that Atomic Energy of Canada Ltd. would engage in joint ventures with the German Kraftwerk-Union (KWU) for the purpose of selling their nuclear technology to Third World and fringe countries.

As an example, Canadian Foreign Minister Mark MacGuigan cited the development of a "Power plant package" (Canadian reactor and German delivery system). The advantage of such cooperative projects, he said, lie in joint marketing as well as in combining Canadian technology and German experience in foreign trade.

The Federal chancellor emphasized the FRG's great interest in Canada's raw material resources, their exploitation and concomitant investments. He said that cooperation would be ideal because Canada is one of the world's major uranium producers. Schmidt made it clear to Trudeau that the FRG no longer has any objections in this matter, after earlier discord in that area.

Impromptu Deliberations

However, German government circles characterized the expansion of other areas of energy policy as "impromptu deliberations." This involved natural gas exploration (with subsequent liquefaction for transport), oil fields in the Canadian Arctic, and coal production. Schmidt thinks there are limits for coal imports to the FRG.

Both chiefs of government attempted to explore the complaints by German investors who feel discriminated against by Canadian laws. However, Premier Trudeau would not accept any blame for "economic nationalism." He stated that German investments in Canada had tripled during the last 3 years and that about 96 percent of all proposals from German firms were being approved.

Investor Failure

Schmidt is said to have countered this by stating that prominent investors (e.g. Wolff or Mannesmann) had failed due to exorbitant taxation. The reason for Canadian investment restrictions lies in the fear of foreign influence, especially with respect to U.S. enterprises. For instance, 90 percent of the Canadian automobile industry is in U.S. ownership. However, said Trudeau, German products have a good reputation and are therefore welcome. His country, he continued, is "greatly interested."

Among the severe Canadian conditions for foreign investors are delivery monopoly for the U.S. market as well as provisions for employment and research. The two chiefs of government suggested therefore that industrial delegations from both countries sit down together for the prupose of facilitating mutual investment.

9273
CSO: 5100/2296

FINANCIAL CONCERNS OVER CAIRO'S FRG NUCLEAR PLANT

Bonn DIE WELT in German 20 Jul 81 p 13

[Article by Heinz Heck: "Financing Is A Major Problem"]

[Text] Bonn--Even prior to this week's signing of the political declaration of intention on cooperation in the peaceful use of nuclear energy by the Egyptian and German foreign ministers, Kamal Hassan Ali and Hans-Dietrich Genscher, departmental conferences on further steps have started in Bonn. The principal subject is a supplementary agreement to the bilateral treaty on scientific and technological cooperation of 11 April 1977 between Egypt's Ministry of Electricity and Bonn's Ministry of Research.

Egypt plans to have a network of eight nuclear power plants with a capacity of 1,000 megawatts each by the year 2000; all of these are to be contracted for during the current year, if possible. Two units are presumably going to be furnished by each of the following countries: the United States, France and the FRG.

Nothing is known about the fourth country of manufacture to date. There is some speculation that it might be Canada. But this would mean that in addition to the light water reactors of the other three contractor countries the program would include natural uranium reactors which are the only type available from Canada. Political difficulties for the overall program no longer exist since the Egyptian government has decided to become a member of the nonproliferation treaty. Nor does Cairo have any interest in obtaining "sensitive" facilities, i.e. uranium enrichment and reprocessing of burned out fuel elements. Rather, the contractor countries are to assume responsibility for fuel supply. According to rumor, that is the subject of the agreements signed last March with France and last June with the United States.

In signing the nonproliferation treaty, Cairo has also eliminated the Egyptian-Israeli stalemate on this subject, which goes back over many years. In the past, all potential contracting countries observed the rule of thumb that nuclear power plants should for instance be delivered to Egypt only with equal consideration for Israel, and vice versa. However, Egypt's energy requirements can no longer stand further delay, which led President Anwar El-Sadat to sign the nonproliferation treaty, while Israel is still not prepared to do so.

From the point of view of the contractor countries, the main problem is the financing of the program. At the present time, the FRG guarantees up to DM 20 million worth of individual transactions through Hermes. Even though Cairo has surprisingly announced that it would pay cash for the reactors from oil revenues, it is likely that, considering a foreign currency cost of more than DM 2 billion per unit, a considerable need for residual financing would remain in effect, at least temporarily.

9273
CSO: 5100/2296

NUCLEAR ENERGY DEVELOPMENT STATUS REPORTED

Athens BUSINESS & FINANCE in English No 152, 25 Jul 81 pp 2-4, 6-10

[Text]

The complicated problems that there are in connection with the installation of a nuclear reactor in Greece arise from both the nature of the reactor, and the particular characteristics of Greece. The most important of these problems concern those conditions and requirements necessary to ensure both the economics and the safety of such a plan. But above all what is required is an urgent inquiry into the extent to which a nuclear power station in Greece is necessary. The number of sound arguments that there are against such a plan make the examination of all the other alternative solutions a necessity.

If it is decided that it is essential to launch a programme for the installation of nuclear electric units, (the control of PPC and EBASCO appear to be suspended), then this programme must be carried out in connection with the creation of the appropriate infrastructure in the sector of nuclear technology. The expenses for such a long-term programme will be no more than between 1% and 2% of the total cost of a nuclear installation.

Another factor in nuclear development is the need for special legislation and regulations, particularly for the normal development of the related activities, and the protection of the public and the environment. Further emphasis must also be given to the uranium deposits that exist in Greece, and the intensification of the geophysical researches.

However, the reactions of other countries over recent years to nuclear programmes, give rise to many doubts:

– In the USA, the nuclear programme has been cut by 200 million dollars.

– In Sweden, a referendum was held to decide whether or not to shut down the nuclear reactors in that country.

– Over the last four years, not a single new nuclear energy unit has been put into operation in West Germany.

At this point we should also mention that the cost of an installation in Greece would be 30% higher than in the other developed countries, because of the costs of transportation, employing foreign specialists, etc. Furthermore, in a period of political crisis, it would be very easy to cut off Greece's supply of both fuel (uranium) and necessary spare parts.

All the Western European countries have adopted a polymorphous energy policy, and neither domestic nor industrial consumption is base exclusively on electricity. A significant part of the consumption is in fact of natural gas. In Greece, by comparison, both domestic and industrial energy consumption is based on electricity, which is the most expensive form of energy. A viable energy source for Greece could be lignite, and the geophysical researches into the Greek subsoil should be intensified. From the existing data, it appears that oil deposits will last for another 75 years, but the fact must be remembered that known deposits of the other conventional fuels are about 25 times the size of the oil deposits. A certain amount of caution is therefore necessary in predictions of the sort that the planet earth will be self-sufficient in conventional fuels only for another number of years, and that the only solution is the development of nuclear energy. Past experience has shown that these predictions can often be refuted, and are sometimes made with the sole aim of increasing the profits of some multi-national companies.

Of course, Greece does indeed have an energy problem. But it has been proved that Greece is not lacking in solid fuels. Greece has significant lignite deposits, turf, oil, natural gas, and several areas that could be exploited for geothermal energy.

The breakdown of the energy potential that has covered Greek needs over the last ten years is as follows:

Solid fuels – 20%
Liquid fuels – 75%
Hydroelectric power – 9%
Gases, etc. – 0%

As can be seen from these figures, energy needs are met 78% by imported primary sources, and 22% by domestic ones. It is interesting to note that the corresponding average percentages for the EC are 57% and 43%. It is clear from all this that at the present time there is a huge deficit in the country's balance of payments for energy. The exported exchange amounts to about 30 billion drachmas annually. And it is also important that the energy policy of the government be directed:

a) to the solid fuels. These deposits would appear to be in excess of 5 billion tons, meaning that needs can be met for another 100 years, approximately.
b) hydroelectric power. Although there has been significant development of the exploitation of this form of energy in the post-war period, there are still margins for further exploitation.

Directing the energy policy towards domestic sources may well allow us to postpone the undertaking of a nuclear programme for at least the next two decades, an advantage, as there are serious difficulties to be overcome in both the technology and the economics involved. At the same time, Greece will thus win the time necessary for the development of the appropriate infrastructure for a nuclear exploitation programme, which is, at the moment, non-existent.

Finally, it should also be brought to mind that a) all the fuel deposits on our planet (ie coal, oil, natural gases and uranium) have an energy potential equal to that which the earth receives from the sun in 45 days. b) the problems that are to be faced today in the transformation of solar energy into electrical energy, and the use of hydrogen instead of benzine or oil, are far smaller than those created by nuclear reactors, the problems related to breeder reactors, and insignificant compared to those problems that had to be overcome in order to enable Man to land on the moon. c) According to the German Professor E. Justi, the energy problem would have been solved by now if just 1% of the expenditure that has been given to nuclear energy programmes had been given for the exploitation of solar energy.

Present Agents and Legislation in Greece

1) The Demokritos Centre for Nuclear Research, and the Hellenic Committee for Nuclear Energy.

The Hellenic Committee for Nuclear Energy (HNCE) is an independent public service that until 1978 was directly under the Prime Minister, who, at that time gave the responsibility for its supervision to the Minister of Co-ordination. The Minister of Co-ordination exercises this control through the Scientific Research and Technology Service of his ministry. The operation of this service was initially defined by the Laws 3891/58 and 4115/60, although the Law in force today is Law 451/68, according to which the HCNE initiates, supports, or conducts scientific and technological research into the use of nuclear energy in the various sectors of science, industry, agriculture, and national defence.

In greater detail, the functions of the Committee are

– to follow international developments in new methods of production of nuclear energy.
– to introduce and to supervise the taking of those measures that are necessary for the protection of the public from the effects of nuclear energy.
– to supervise the training of scientists in order to ensure that needs for the application of nuclear energy are met.

– to provide scientific and technological assistance to the public services, and organisations in connection with the use of nuclear energy.
– to co-operate with other organisations for the discovery and exploitation of radioactive ores.

The HCNE is also responsible for the granting of permits to import, install, and operate nuclear reactors in Greece, the granting of permits for the production and use of radioactive materials and sources, and the control and purchase of Greek radioactive ores.

Today, 700 people are employed by the HCNE, of which 170 are scientific personnel. The reactor office has only three nuclear scientists, who are employed in the operation of the experimental reactor at Demokritos (5 thermic MW), while ten more make up the Group for the Regulation and Control of Nuclear Installations.

2) The Public Power Corporation (DEH)

a) Sector for Studies and Contracts.

This sector is concerned with the supervision of studies and other activities related to the future installation and operation of nuclear installations, the education and training of the Greek scientific potential for the manning of the nuclear stations, the initial formation and construction of standards, and the signing of contracts for the acquisition of nuclear fuels.

b) Sector for Nuclear Safety and Regulations.

This sector is concerned with the application of the special legislation, and the general planning of the structure of the security and safety regulations related to the construction and operation of nuclear stations. It also works in co-operation with other similar Greek and foreign organisations.

3) Other agents.

The Geological Studies and Research Institute (IGME) which is under the Ministry of Industry. Its primary aim is to conduct geological and mining research into the Greek subsoil. A part of the activities of this Institute is the search for uranium.

The General Legislative Framework.

The general legislative framework for the nuclear installations in Greece is basically defined by Law 854/71, which provides legislation for the installation and operation of nuclear reactors, and the definition of the security measures. There is also Law 181/71, which defines the security measures for radiation. In addition, the Mining Codix (Law 210/73) in Clause 143 states that only Greek nationals have the right of research and exploitation of "minerals with radioactive substances".

International laws accepted by Greece.

Greece has accepted the Paris Convention on Third Party Liability in the event of a nuclear accident. (1960) It has also accepted the other part of the same convention which was agreed in Brussels in 1963. These have all been legalised through Law 336/69. Greece has also signed the agreement prohibiting testing of nuclear weapons in the earth's atmosphere, space, and in the sea. This was implemented in Greece by Law 4335/63 (Partial Nuclear Test Ban Treaty). Greece has also signed the Non-proliferation of Nuclear Weapons Treaty.

Existing contracts between the Greek state or public organisations, and foreign states, organisations, or companies.

a) Association with the International Atomic Energy Agency.

Greece is a member of IAEA through the Hellenic Nuclear Energy Committee. The IAEA is an international organisation which offers directions on the use of nuclear energy, and particularly concerning security and safety. However, it cannot be said that Greece has as yet fully exploited that technical aid offered by the IAEA, and such aid that Greece has received from the organisation has not been requested in the proper way.

For example, in the period from 1973-1975, research was conducted in the localisation of radioactive deposits in the areas of Macedonia and Thrace by IAEA scientists A. Y. Smith, and A. Armour Brown. This research was conducted within the framework of an IAEA programme in Greece, but until today, the Greek public has not been informed of its findings.

It is interesting to note that the compilation of the results was carried out by the foreign scientists, which means that there was not real co-operation with Greek scientists.

b) Association with the Nuclear Energy Agency of the OECD.

The Nuclear Energy Agency (NEA) has organised a data-bank, which is at the disposal of its members, and concerns electronic computer programmes for the solution of problems concerning reactors. No significant use of this data has as yet been made by Greece.

c) Association with EURATOM (EC)

The role of the EC in connection with nuclear fuels arises from the EURATOM Agreement which was signed in 1957 by the then six Community member-states. Thus they formed the Communaute Europeene de l' Energie Atomique. The three new members of the EC signed the EURATOM Agreement in 1972, and it will be in force for Greece as well. The EURATOM Agreement refers to the nuclear programmes of the member-countries. It has four major research centres – Isra, in Northern Italy; Mole in Belgium; Geel, also in Belgium, and Petern in France.

d) Contract with EBASCO

Greece has signed a contract with the American company EBASCO, to carry out all the preparatory studies for the installation of a nuclear power station in Greece, expected to come into operation between 1990 and 1995.

The lack of organisation in the exploitation of nuclear energy, and dependence on foreign technology.

a) Research into radio-active deposits.

Two agencies are engaged in the research into and discovery of radioactive deposits. These are DEPO of the HCNE, and IGME. The specialised personnel and the equipment are shared by both of these agencies, with the result that there are fairly grave shortages in both, which could be at least partly eased through co-operation.

This, and the lack of co-ordination in the programming of research, create difficulties, and delays in the discovery of radioactive deposits. The HCNE has greater means and experience, while IGME is in a better position to conduct drillings. Quite apart from these, another disadvantage is that the given financing is insufficient for a sophisticated research programme for the Greek subsoil. So possible uranium-bearing areas must remain unexplored for long periods of time, until the specialised personnel and the equipment are released from other areas.

Another disadvantage in this field is that until the present time, known deposits amount to about 2,000 tons – a quantity that does not justify the creation of installations for their exploitation. In the opinion of the Technical Adviser of the HCNE, Mr Taupitz, for the exploitation of deposits to be economical, they must amount to at least 5,000 tons. The 'possible' 20,000 tons are a very optimistic estimate, as this estimate has been based on simple geological observations, not yet tested with through research. To assess the true value of the deposits, it should be remembered that the operation of a reactor of 800-1,000 MW needs at least 5,000 tons of uranium.

The areas that can be considered promising are Marameno Serron of Xanthi, Papadia of S. Florina. However, it is difficult to describe these as exploitable, as various problems have to be solved, such as the increase of the deposits, the enrichment of the deposits, etc.

b) The installation of a nuclear reactor.

According to international experience, before a nuclear reactor can be installed in Greece, two organised agencies are required for the maintenance, study, installation, operation, etc. of the reactor. One of these agencies would be the State, and the other the exploiting company that would undertake to install the reactor. Both agencies must organise the appropriate intrastructure with the specialised personnel and the correspondent laboratory installations. The role of the State Agency in Greece is filled by HNCE, while according to Greek legislation, DEH has the exclusive right of electrical power production through nuclear stations in Greece, and is the appropriate agent for the promotion and development of the nuclear energy programme.

The HCNE's responsibilities in the installation of a nuclear reactor must be the following:

– the formulation of planning criteria, regulations and standards of security which must be followed for the normal operation of the nuclear unit

– ensuring the good quality performance of the equipment. That is, ensuring that the criteria mentioned above are kept, determining the adequate safety level for the complete protection of the population, environment, and personnel of the installations, exercising quality control, and responsibility for authorising evacuation of the area of the installation, and operation of the nuclear unit, as well as for issuing the order for the interruption of the operation of the station in the event of reduced safety conditions.

The infrastructure that exists today for quality assurance is lacking, and for the quality control is non-existent. These require efforts over several years, with financial backing. Examination of the rates at which both the legislation was formed, and the manning of HCNE proceeds, it would appear to be difficult for HCNE to meet the requirements in quality performance, for a unit expected to come into operation in 1990, while from the aspect of quality control it seems impossible.

DEH'S responsibilities must be:

– determination whether or not a nuclear station is a necessity, and supervision at all stages until the construction and operation of the nuclear reactor.

– it must assume full responsibility for the safe planning, installation and exploitation over the HCNE. According to the Paris Convention, is also has third party liability.

From the number of scientists employed in the DEH nuclear office, (less than 20), it would appear that no substantial infrastructure exists at all, so it is obvious that the relevant studies, regulations, etc., would be prepared not by DEH but by EBASCO, and DEH will simply be forced to accept the proposed solutions.

The expansion of nuclear energy.

. To get some idea of the rate of development of nuclear technology internationally, it should be remembered that in 1960 there were 22 reactors in 5 countries, with a total power of 1.14 GW, while in 1972, there were 181 reactors in 19 countries, with a total of 80 GW. These figures indicate how rapid development has been. But since the mid-1970s, all the countries have cut back their nuclear programmes. It is generally admitted today that the nuclear industry is still only in its first stages. No one type of reactor has taken over the market; all have their advantages. The situation could hardly be otherwise considering that the average age of installations in the world today is less than seven years.

In 1970, at the initiative of the United Nations Organisation, the Non-Proliferation of Nuclear Weapons Treaty was brought into force. But it is important to remember that many countries did not sign this agreement, including South Africa, Argentina, Brazil, Chile, India, Israel, and Pakistan. As is well-known, some of these countries have already carried out nuclear tests. The increase in the number of reactors is expected to have dangerous results – before the year 2000, over 20 different countries will have nuclear weapons. Who will be in a position to control such expansion? Of what possible use will be the conventions for the limitation of nuclear equipment?

The solution to this problem, obviously, does not lie in the suppression of the development of nuclear energy. The problems is to find a means of adapting its use to cause the least damage in the present, and the most favourable perspectives for the future.

How dangerous are nuclear reactors?

The nature and the extent of the consequences of a nuclear accident are completely different from all the other dangers that Man has faced until the present time.

* Man is unable to feel radioactive radiation.

* The long life of the radioactive isotopes means that the danger continues . r almost limitless time.

* In the event of a big accident, the destruction which would take place for

the environment and all forms of animal or vegetable life over an area the size of a small country such as Greece, would be catastrophic, and comparable only to the effects of the explosion of a nuclear bomb.

Despite this, many countries have installed, or plan to install at some time in the future, nuclear reactors. How can this expansion of the use of nulcear reactors be explained when it is of certain that they are related to enormous dangers?

The institute for the safety of nuclear installations in West Germany, Institut fur Reaktorsicherheit (IRS), conducted a study which estimated what the results of a serious nuclear accident would be. According to this study, in the event of a major accident, the liberation of radioactive substances would begin 36 minutes after the event. From that time on, the subsequent dispersal of the radioactive material depends on the meteorogical conditions of the time and location. In relatively mild conditions (with a wind speed of 1 metre per second), the radioactivity of 100 kilometres downwind would be 9,200 rem. The fatal dose for Man is 600 rem.

Accepting that the fatal dose is 600 rem, and assuming a density of population of 485 per square kilometre, then casualties will include 30.5 million deaths, and an area of 63,000 square kilometres contaminated for many years. Radioactivity was estimated to be fatal by the study up to a distance of 400 kilometres from the reactor.

Radioactive Waste.

Apart from those dangers already mentioned, another long-term danger for man is posed by radioactive waste. After a single year of operation, a large reactor has produced as much radioactive waste as would be produced by the explosion of 1,000 atomic bombs of the type dropped on Hiroshima. Until now, the suggested storage areas for radioactive waste have been

1. old salt mines
2. concrete containers that are then sunk at sea
3. vitrification
4. sinking in frozen sea areas

None of these has been proved safe, as because of the long life of the isotopes, it is impossible to predict that they will remain contained within these places for thousands of years.

Nuclear Energy--the Economics

Until 1973, in spite of the many technological achievements made in the field, nuclear energy could not compete with oil. The survival of the nuclear industry until then was attributable more to the fact that nuclear energy was more a by-product of the war industry than its main product. Following the 1973 oil crisis, there was a sudden great demand for nuclear units, and as a result there was an increase in the price of the reactors. The various countries accept as the basis of their energy policy a variety in the methods of energy production, so as not to remain dependent on a single kind of fuel, and face the danger of seeing the nation's industry collapse in the event of an embargo.

After the Arab-Israeli war of 1973, Israel admitted that it did in fact posess atomic weapons – that is, weapons were the main products of the Israeli reactors. Other countries were quick to follow Israel's example, the demand for reactors increased once more, and prices went up yet again. Naturally, countries that were constructing reactors had no qualms about having opponent countries for their clients, and the USA did not hesitate to supply Egypt with nuclear units. This was also the case for India and Pakistan.

The widening use of nuclear reactors forced many scientists to reconsider what their responsibilities were on this subject. The press kept the public informed about the consequences of the nuclear energy expansion. Companies were therefore forced to maintain and improve their security measures, as well as safety measures for the protection of the environment. This led to an even higher price for reactors.

However, this initial optimism about the development of nuclear programmes did not last. The various governments and electricity producing enterprises, sensitive to the cost, soon began to revise their nuclear programmes, and many orders for reactors were cancelled.

As is well-known, one of the main advantages of nuclear, over the other energy forms, is the low cost of the fuel. Obviously, economists did not expect the price of uranium to remain stable, but they did expect that it would show a logical increase in price, comparable to the other fuels, except oil. However, the price of uranium in a three-year period, from 1973 to 1976, increased six-fold. This was far beyond the expectations of both the economists and the specialists in this field, such as Westinghouse. Westinghouse, one of the largest reactor-manufacturing companies, signed a contract with its clients, to provide them with uranium for 29 years at an average price of $ 9.50 a pound. Since in 1976 the price had risen to $ 40, Westinghouse found that it had a deficit of 2 billion dollars.

So we see that uranium, like all other economic goods, comes under the laws of supply and demand. However, the situation for uranium is even more difficult, as known deposits are expected to last between 10 and 20 years longer, according to the percentage of the total energy network that will be nuclear, while oil deposits are expected to last another 30 years.

Therefore, even those who assess its worth according to the profit involved, and ignore the human factor, can clearly see that the expansion of nuclear energy is not economical. The reactor fuel is not a raw material, but a high-technology product. The natural uranium, which contains only 0.7% fissionable material, has to be enriched. Units which are able to conduct this enrichment process are to be found only in the USA and the Soviet Union. The reason why there is such a limited number of these units to be found, is the massive investment capital required.

The result of all the above is the likely future increase in the cost of enrichment, because of the insufficient potential of the industry. Quite apart from the enrichment, the reactor fuel must also be specially refined, and although the cost of the processing is expected to remain stable, the scientists of the IAEA give no explanations to really justify this conclusion.

In fact, the cost of reprocessing is expected to increase sharply, because installations of this kind are the most threatening for the environment, and therefore the most unwanted. Even more important, the radioactive waste from this industry must be stored in a way that is more secure than any that have been found so far today. It is estimated that the costs of storage will be the same as those of processing.

For those countries that are at a distance from the reprocessing units, transportation costs and insurance rates must also be added to the total expense, and insurance rates are naturally extremely high. The capital cost of the reactors is far greater than that of the thermal units. The price for a reactor of 1,000 MWe increased from $ 134 per KWe in 1967 to $ 1,200 in 1976. A considerable part of the cost was that necessary for security and the environment, which increased from $ 25 million in 1967 to $ 420 million in 1974 for reactors of 1,000 MWe.

There is a fluctuation in the data given to the public on the cost of electricity. This cost also differs from country to country. According to the French pricing system, the cost of the electrical energy per KWh from the reactors, is half of that produced from oil. However, the latest figures from the USA would indicate that the cost is the same for both, with a difference of only $ 0.005 in favour of nuclear energy.

As a general conclusion, it can be stated that nuclear energy today is in a transition stage, and that a country must be more than brave to decide to attempt to solve its energy problem exclusively through the use of reactors.

Nuclear Energy in Developing Countries

The use of nuclear stations, which many of the developed countries have adopted as a solution for their energy problems, is not attractive for the developing countries, such as Greece, for the following main reasons:

– The advantages of nuclear stations become obvious only when they concern units of production of over 600 MW, but these countries are up against difficulties in introducing units of such power into their systems.

– Because nuclear technology is imported, it is very expensive. Also, in a country which is not able to manufacture between 70 and 80% of the technical equipment needed for a nuclear station, in its own domestic industry, the country becomes completely dependent on outside sources.
– The supply of nuclear fuel is obtainable only from two or three countries in the world, and only after industrial processing of the fuel, which worsens the problem, and increases the dependence.
– Security and safety systems place an extra burden on the cost of installation of a nuclear power station, to an amount that is two or three times greater than an equivalent oil-fired station. During the seven years between 1968 and 1975, the capital cost of a nuclear station increased five-fold.
– The known deposits of uranium in the world will not last longer than 1990. It is generally believed that an abrupt increase in the price of uranium will take place.

'Yellow cake' uranium deposits are estimated to be about 2,000,000 tons. Considering the estimates which were made in 1977 on the rate of installing nuclear reactors in the world, and remembering that a reactor of a power of 1,000 MW requires 200 tons of 'yellow cake' annually, we can draw the conclusion that the thermal reactors will not last later than the year 2000. Any country, therefore, that installs a reactor in the year 1990 (as has been suggested for Greece), will almost immediately come up against supply problems. Uranium prices will be extremely high, and nuclear power will then be as uneconomical as oil.

At the 33rd Conference of the Economic Commission of Europe of the OECD (18.1.1978), it was officially announced that the uranium deposits which are available to the OECD countries at a price of $ 64 - $ 65 a kilo, would be sufficient to supply the reactors to be installed in these countries until the mid-1990s. After 1995, reactors will have to base their operation on uranium deposits whose cost is unknown today, and whose very existence is unsure. Obviously, it is not necessary to have to wait until 1995 for prices to increase; the price today is between $ 80 and $ 85 per kilo.

Breeder reactors.

The so-called breeder reactors have been put forward as a proposed solution to the limited prospects of the thermal reactors. It is not known when they will actually appear on the market, but apart from this, and the many safety problems they present, the major cause for concern in their use is the fact that they are concerned with the increase of plutonium, a raw material that is used in the construction of nuclear weapons. Plutonium is highly toxic – even a millionth of a gram is fatal. It is difficult to accept the fact that this material will be produced, transferred, sold, and processed in thousands of tons in densely inhabited Europe.

But even with the use of non-breeder reactors, there are problems of major concern, that as yet have not been solved:

– there is still no satisfactory method for disposing of radioactive waste.
– the quality of uranium as a dangerous raw material for the manufacture of weapon adds a whole new dimension to the possibilities for the policies of those countries which are in a position to export enriched uranium.
– there is no guarantee that opportunist pricing policies will not be applied, or that uranium-producing countries will keep their prices low when oil-producing countries raise the price of oil.

The total installed electrical power in Greece today is 4,750 MW, with an annual production of 22 billion KWh, and with an expected rate of increase of 6-9% a year. In 1978, 47% of the electricity produced was from lignite, and 18% was from hydroelectric power. According to the Ministry of Industry and Energy, the corresponding percentages for 1988 will be 75% and 11%. According to the Public Power Corporation (DEH), towards the end of the decade, domestic primary energy sources will be used in 88% of electric power production. Also, according to this data, the major problem at the end of the decade will be how to produce the other 12%. Will it really be necessary to meet this need with a nuclear reactor?

Research into other energy forms have been set back 20 years as a result of the single-minded concentration on nuclear energy. Today, of course, a far greater effort is being made, but for Greece it is still not enough. The 2% of Greek needs which the Ministry of Industry and Energy expects solar energy to cover by 1990, is not enough. The geothermal sources in Melos, where there is potential for a station of 10 MW, and in other places, could and should contribute more decisively to the energy supply of these areas.

When discussing the various problems related to nuclear energy, emphasis must be given to the human factor. For Greece to launch a nuclear programme, there must be in the country a sufficient number – both quantitively and qualitatively – of trained personnel in various sectors; engineers, directors, special technicians, security personnel, etc. Unfortunately, the human infrastructure in Greece is insufficient, and neither are there programmes for the creation of the appropriate infrastructure. The easy solution – importing foreign advisers – will keep nuclear technology a 'foreign body' in Greece, and will keep Greece in a situation of technological and therefore political dependence, quite apart from any considerations of cost.

The basic studies for the selection of the site for the installation of the reactor is to be made by the American company EBASCO. The Greek Public Power Corporation will simply choose one of the five sites that EBASCO proposes.

Countries such as England, France and the United States, that have large nuclear programmes under development, employ hundreds of thousands of specialists and scientists in nuclear technology. It would perhaps be better at this stage for Greece to forget her ambitions and purchase only a small reactor of between 60 and 80 MW. In this way, Greece will then have the opportunity to train personnel under conditions far more favourable than they would be with a 600 MW reactor.

To install a reactor of 600 MW would be much more expensive than to install one of 1,200 MW – about 4% more expensive per installed MW. Today, to install a 1,200 MW nuclear station, one would need $ 1.5 million per MW – at conservative estimates – and this figure could easily rise to $ 1.8-2 million per MW, a total amount of $ 1.8 billion.

Table 1: Time development of the nuclearisation percentage in various countries.

	USA	USSR	EEC	SPAIN	SWEDEN
Year of beginning	1957	1958	1956	1968	1964
first installation	0.07	0.2	0.04	1.1	0.08
1970	1.8	1.0	3.8	0.8	2.6
1974	6.4	1.7	4.9	4.7	5.1
	FRANCE		**E.GERMANY**		**W.GERMANY**
	1959		1966		1966
	0.25		0.6		0.7
	4.6		0.6		1.9
	5.9		3.3		5.0

A reactor of about 800 MW purchased today would cost approximately $ 1.5 billion, an amount to be paid off over 8 years. If, as expected, the programming and installation of reactors were to take place every three or four years, then the costs would become unbearable. The announcement that 5,000 tons of uranium had been found in Macedonia, and the prospects for the discovery of other deposits are positive factors in the consideration of whether or not to install a reactor in Greece, assuming that the deposits are exploitable. But the economics of a future reactor will not be much influenced, as the participation of fuel in the total cost per KWh is limited to between 15% and 25% (depending on the type of reactor). The other 75-85% is made up of capital and operational costs, and remains unaffected by the existence or not of Greek uranium deposits.

Although the search for uranium deposits began twenty years ago, the results have not been those expected, and basically, the lack of infrastructure has not allowed any extensive research until today.

As has already been mentioned, the 5,000 tons of Greek uranium will be sufficient to cover the needs of a reactor of 600 MW for 25 years. Assuming that this station will begin operations in 1990, when, according to the DEH estimations, total electric power production in Greece will be 40,000 GWH and considering that in ideal terms of operation the annual production of the reactor will not exceed 3,600 GWH it can clearly be seen that the contribution of this station will be only 1/11 of Greek needs in electricity, and 1/30 of total Greek energy needs.

The cost per KWh of energy that comes from the nuclear reactors is almost the same as that provided by oil-fired stations. This is even more the case in Greece, as various related studies have proved that the cost will be 15%-20% higher than in the USA. This does not include the cost of the underground installations that would have to be built for security and safety reasons.

Another problem related to the installation of reactors in Greece is the fact that a unit of 1,000 MWe or even 600 MWe even in 1986 will be a relatively large one for the Greek system where the greatest unit today is not more than 300 MWe. Further, as can be seen from Table 1, no country has made the single large step of transforming all at once even 1% of its network to nuclear-based power.

Table 2: Orders for reactors and cancellations. 1970-1980.

	Orders	Cancellations
1970	14	0
1971	21	0
1972	38	6
1973	38	0
1974	4	9
1975	3	10
1976	4	5
1977	2	2
1978	2	11
1979	0	11
1980(Jan - Mar)	0	11

Nuclear energy in the western world is monopolised by the USA. The main US companies are Westinghouse and General Electric, whose future is not sure. Any nuclearisation of the electrical network has as result, the intensification of economical and political dependence on those who monopolise both the fuel and the spare parts. The fuel supply is particularly vulnerable in a period of crisis, on the argument that uranium could be used to make weapons.

Finally, considering the instability of the market for nuclear energy, it does not seem wise for Greece to seek the solution for the country's energy problems in nuclear reactors. It should also be remembered that following the 1973 energy crisis, many other countries at a more advanced stage of technological development than Greece, decided to proceed with a nuclear programme, but reached the conclusion that nuclear energy, at the stage at which it is today, could not provide a solution. Orders for reactors were therefore cancelled, and the reactor-manufacturing companies in the USA sold only 4 reactors in 1975, three in 1976, compared to sales of thirty-five in 1973. (See Table 2).

During the whole decade from 1970 to 1980, 160 nuclear reactors were ordered, and 68 orders were cancelled. 90% of the orders were placed before 1973. Following the accident at Three Mile Island, Pensylvania, there was a radical revision of the nuclear programmes in Europe.

For Greece, alternatives to the use of nuclear units could easily be increased use of hydroelectric stations, and lignite.

Nuclear Energy and Greece--the Other Problems

1. Selecting a site. – Greece is a country subject to seismic activity, and it is extremely difficult – if not impossible – to find an anti-seismic area far from inhabited zones. Furthermore, Greece is strategically placed in a region that could well be the location of military conflict. In any event, the reactor would have to be built beneath the earth, and as a result, its construction costs would be raised 30-40% above the normal.

2. Nuclear waste. – The disposal and storage of nuclear waste is not only a huge international social problem, but also a special problem of any country that decides on the installation of nuclear reactors. Today, all countries that offer technology, or nuclear fuel, do not undertake responsibility for the nuclear waste. G. Harry Stein, in his book "The Third Industrial Revolution" says that for the dumping of nuclear waste in space, or on the moon, (one of the proposed solutions), the tremendous expense of $ 720 per kilo, or $ 720,000 per ton will be required.

In the New York Times of 13th February 1980, a comment on the government decision for the definite solution of the nuclear waste disposal problem was commented on, under the title "Good sense in nuclear waste". The article said...".... Radioactive waste disposal has been shamefully neglected for most of the nuclear age, now in its fourth decade. Both the government and the nuclear industry long assumed that by the time there was enough waste to be troublesome, some way would have been found of getting rid of it. That has not happened. Used fuel rods are beginning to choke some reactor storage pools. Waste has leaked from aging casks on military reservations. But still there is no agreement on permanent disposal..."

Earlier, also in the New York Times, (November 7th 1978), under the title "Nuclear waste: Our Suicide Path", on the subject of the fatal effects of the dumping of toxic wastes in the 'Love Canal' area of upstate New York, the paper stated: "..... the tragedy of Love Canal can be redeemed only by recognising that we cannot continue on the path of suicidal disregard for the earth, our home. The other path, that of alternative energy development, promises no get-rich-quick solutions to our needs, but is more in keeping with life-centred natural processes which are readily available to all. It is to these 'soft energy' paths that we must turn, if we are to assure the continuation of life on this planet...."

3. Low installed base power. – A reactor of 1,000 MWe, even if it were to begin operations at the end of the 1980s, would cover only 15% of the Greek basic network. This, from the economic aspect, is inexpedient.

4. Nuclear reactors only reinforce electrical power production. – While it is accepted that electrical energy is the most expensive energy form, we continue to suggest as a solution of the energy problem, electric power production. It is interesting to note that while in the EC countries, electrical energy covers 30% of total energy consumption, in Greece, the corresponding percentage is 40%.

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END

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 112

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WORLDWIDE REPORT

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URANIUM BOOM FORESEEN IN ALLIGATOR RIVER AREA

Aboriginal Claim Rejection

Canberra THE AUSTRALIAN in English 23 Jul 81 p 1

[Article by Geoff Sorby and Bruce Jacques: "Judge Paves Way for Uranium Boom"]

[Excerpt] A judge has given a green light for the development of the world's largest deposits of uranium in the South Alligator River area of Arnhem Land.

In a report on Aboriginal land rights to be published today, Mr Justice Toohey, the Federal Government's Aboriginal land commissioner, rejects 90 per cent of Aboriginal claims for the Alligator River area of the Northern Territory, including the Kakadu State Park.

The judge's report provides a major boost for the mining industry. But it is a setback to Aboriginal aspirations in the area.

The judge's recommendations have to be ratified by the Federal Government.

But if the go-ahead is given in two months' time, the major company involved, Pancontinental Mines, is confident that uranium mining will begin in 1985.

A major political row is certain because of the ACTU's and the ALP's opposition to uranium developments.

Pancontinental is now pressing ahead with multi-million dollar compensation arrangements with Aboriginal tribes in the area.

Jabiluka Timetable

Sydney THE SYDNEY MORNING HERALD in English 23 Jul 81 p 25

[Article by David Wheeler: "Delays Could Close the US Window for Jabiluka"]

[Excerpts] Any delays in getting Pancontinental Mining's $500 million Jabiluka uranium project off the ground could result in the company losing a prime opportunity to clinch a strong position in the US uranium market.

At present, US producers are cutting production in the face of rising costs and weakening uranium prices. Mines in Wyoming and Mexico have closed down. Utilities are selling off their stocks.

The result, says Pancontinental's chairman, Mr Tony Grey, is that a "window" will open in the US market which Jabiluka, hopefully, can enter.

"But if we don't get it going soon then I fear the opportunity will be lost to our major competitor--Saskatchewan--and the window will close," he said.

Pancontinental has high hopes of finalising negotiation with Aboriginal leaders and to go ahead with the project by early next year.

Jabiluka is 65 per cent owned by Pancontinental and 35 per cent owned by Getty Oil. Under foreign investment guidelines, Getty will be required to sell 10 per cent of its holding to Australian interests before production starts.

Pancontinental has already secured some customers for the 65 per cent of production it will be responsible for marketing.

"We have spent the past five years talking with nuclear utilities around the world, and many of them have now reserved tonnages for purchase from Jabiluka," Mr Grey said.

"We expect the major proportion of sales will go to Europe, with the remainder to South East Asia and the US.

"Despite the weak market, which is due to a general slow-down of nuclear programs around the world, and licensing problems in the US, we managed to convince buyers of the tremendous strategic advantages Jabiluka offers.

"First, it is a large deposit. Second, it is of high grade. These two factors combine to give the project a lower cost spectrum.

"Third it is located in a politically stable country.

"The Reagan Administration is opening the way to easier development of nuclear power plants. But the main thing which will revive the market will be economic recovery in the US."

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URANIUM ENRICHMENT INDUSTRY PREDICTED FOR SOUTH

Canberra THE AUSTRALIAN in English 16 Jul 81 p 36

[Article by Wio Joustra: "Enrichment Industry Here 'By End of Decade'"

[Text] Australia will have a uranium enrichment plant before the end of the decade, according to the technical director of the Australian Mineral Development Laboratories, Mr Ron Wilmshurst.

Mr Wilmhurst, an adviser to the South Australian Government, told a National Science Forum luncheon in Canberra yesterday South Australia would be the best place to build the enrichment plant.

The gas centrifuge process developed by the British-Dutch-German owned Urenco Centec group would be the best process for the Australian plant, as the diffusion process would be phased out in the next two decades, he said.

"The Australian plant will be the only one in the world totally funded and operated by private enterprise," he said.

He predicted a change in market conditions in the near future from the depression to enrichment production on a large scale.

"Before the end of the century Australia will be a major supplier of enriched uranium to an expanding world enrichment industry," he said.

Mr Wilmshurst said an enrichment industry in Australia would be desirable on the grounds of economy and nonproliferation.

It would also be a worthwhile addition to the direction of further processing of Australia's minerals.

"In terms of added value, depending on yellowcake prices, conversion to uranium hexafluoride may add 10 per cent and enrichment a further 100 per cent to the value of our uranium," he said.

"There are therefore excellent economic reasons for the establishment of an enrichment industry in Australia."

He said South Australia was the frontrunner for the plant because it had:

--The appropriate industrial support.
--Available energy.
--It was centrally located to supplies of yellow cake.
--It had adequate industrial land available with appropriate infrastructure already in place.

Mr Wilmshurst said the feasibility study by the Uranium Enrichment Group of Australia--a consortium comprising Peko-Wallsend, BHP, CSR and Western Mining--would be completed in 2-1/2 years at a cost of $5 million.

The appropriate technology would be selected within six months and a further economic feasibility study of an enrichment industry would take another two years.

CSO: 5100/7551

BRIEFS

MORE ACTU ANTI-NUCLEAR ACTION--Adelaide--A container ship was prevented from entering Adelaide Harbour yesterday for 24 hours because it had defied an ACTU ban last year and transported uranium yellow cake from Brisbane to Canada. The Seamen's Union refused to supply a tug to bring the foreign owned Paralla into harbour until early today. The Paralla, which is at present carrying only general container cargo, has been at anchor in the outer harbour since early yesterday morning. A Federated Miscellaneous Workers' Union spokesman in Adelaide, Mr Danny Connor, said that in May the ship entered Brisbane harbour in the dark without the aid of tugs and loaded a shipment of uranium yellow cake which had been sitting in the Brisbane railway ground for 12 weeks because of the ACTU ban on its export. He said the present union action was being taken because the ship had violated the ACTU ban. [Text] [Sydney THE SYDNEY MORNING HERALD in English 13 Jul 81 p 2]

NUCLEAR WEAPONS CALL--Sections of the Liberal Party are pressing the Prime Minister, Mr Fraser, to rewrite defence policy and start planning for nuclear weapons. The demand for change has the full backing of the State Council of the party's West Australian branch, which has just sent a report to Mr Fraser arguing that the existing defence policy be scrapped. The report, released in Perth yesterday, claims that unless Australia doubles defence spending, its present state of "inertia" would leave the country "up for grabs." But one of its most controversial recommendations is on nuclear weaponry. It draws the line on Australia acquiring atomic bombs immediately, but says that at the first hint such weapons are being developed by other countries in the region, Australia should get its own. Meanwhile it says Australia should work towards reducing the considerable lead time needed to acquire the technology by "establishing an embryo on which to base the possible future requirement to produce nuclear weapons and the associated delivery system." The report says this would mean providing the money now for nuclear weapon planning, research, and development. "It is also a necessary corollary of this request that intelligence work in the region be given high priority so that the maximum possible warning is given of the nuclear ambitions and development of our neighbors," it says. [By Peter Terry] [Excerpt] [Canberra THE AUSTRALIAN in English 24 Uul 81 p 3]

CSO: 5100/7551

BRAZIL

PHYSICIST JOSE GOLDEMBERG URGES NUCLEAR TIMETABLE RESTRUCTURING

Sao Paulo FOLHA DE SAO PAULO in Portuguese 26 Jul 81 p 33

[Excerpts from exclusive interview with physicist Jose Goldemberg by Paulo Marques; date and place not given]

[Text] In an exclusive interview with FOLHA, physicist Jose Goldemberg stated: "In order to make NUCLEP [NUCLEBRAS Heavy Equipment, Inc], the NUCLEBRAS company responsible for the manufacture of equipment for nuclear powerplants, viable, the government would have to construct one nuclear unit per year, which is absolutely impossible. And therefore, what needs a reform is not Brazil, but rather the NUCLEBRAS timetables."

According to Professor Goldemberg, the fundamental error in the program signed in 1975 by Brazil and the Federal Republic of Germany was to make the nuclear industry vertical in arrangement and to select enriched uranium as a fuel for the nuclear powerplants. Unlike countries such as India, Canada and Argentina, which opted for natural uranium, Brazil chose the most expensive and most complicated course of action. Hence, the lags in the program have stemmed from its own giant proportions.

Regarding the construction of the Peruibe nuclear powerplants, Goldemberg is of the opinion that, "There is no urgent need to begin the projects. Moreover, that is the opinion of the Sao Paulo government itself, and it seems to me to be a provocative maneuver to reopen the discussion of those Sao Paulo units. After all, they have no means of being started during the tenure of the present government."

Following are excerpts from the interview:

The Strategic Model of the Sector Is Unsuitable

FOLHA: How does the scientific community view the proposal from the chairman of the National Confederation of Industries (CNI), Albano Franco, to Minister Cesar Cals, indicating that the Ministry of Mines and Energy should slow down the construction of nuclear powerplants? Is Cals' argument, to the effect that the construction of a small number of plants would not develop nuclear technology and would not attract investors from the capital goods sector, a valid one?

Goldemberg: Well, the statements made by the chairman of the National Confederation of Industries lent support to a position already assumed by the scientists several years ago. They come from an important sector of Brazilian society, which has just come to realize that the strategy devised by the Geisel government for bringing Brazil into the nuclear area is inappropriate. What has been under discussion since 1975 is the model for the transfer of modern technologies to Brazil; not so much the nuclear energy, but the model that should be followed in introducing aerospace, computer and advanced metallurgical technology, and so forth. Nuclear energy enters into this context, because it is a productive technology; that is to say, the mastery of the nuclear sector demands a knowledge of several types of technology which are useful for other purposes. For example, it is impossible to have a nuclear industry without a well developed metallurgy, a well advanced welding technology and a strong electronic industry. At that time, what was believed perhaps with a certain degree of naivete was that the development of nuclear energy would be a dynamic factor for the nation's development. And what has happened with the model devised in 1975 is that a growing number of sectors are realizing that this was an unsuitable model. The last sector to realize this has been the National Confederation of Industries.

Minister Cesar Cals has argued in the press that the very size of the nuclear program is required to make the orders possible for industry; that, if the program were a program with only two nuclear reactors, it would not be attractive to industry. This means that the minister takes the NUCLEBRAS programs seriously. What he needs to do is modify the timetables, because nuclear industries as such exist in but few countries in the world. It would be difficult to find a nation in the world that has a NUCLEP, as Brazil does, which is a capital goods company engaged solely and exclusively in the production of nuclear components.

FOLHA: What is the fundamental impropriety in the program?

Goldemberg: The impropriety in the program consists of two parts: one, it is a technological choice that seems unsuitable to me; second, the manner in which it is to be implemented from an industrial standpoint. The improper technological choice was that of the policy of enriched uranium in a country such as Brazil, which could hardly become converted into a great nuclear power from the standpoint of the use of nuclear energy for peaceful purposes. The nations which started with modest nuclear programs began with natural uranium. This holds true even for France and England which, at the end of World War II, were unable to obtain enriched uranium, which was denied them by the United States. India, Canada and Argentina itself pursued the path of attempting to develop nuclear energy using natural uranium, which is a technology that demands a lesser volume of initial investment. With the passage of years, it is possible that the investment will end up being large, but the system using natural uranium is less vulnerable to outside pressure. And Brazil decided to start afresh, and become involved, from the outset, in a grandiose nuclear energy program. To make this program viable, it adopted a complicated technology based on the establishment of enrichment and reprocessing plants, and so on. A model of industrial transfer was established which entails the need for eight nuclear reactors. A program with enriched uranium of the type that Brazil devised is a program which does not lend itself to a change in scale; there is a minimal scale.

FOLHA: Minister of Mines and Energy Cesar Cals has mentioned the establishment of eight units. Do you agree with that number?

Goldemberg: No, I don't agree that eight should be the minimal number; but there is a minimal number. It could not be eight; it could be four, but it also could be two.

FOLHA: Four is the number cited most often. Does that make sense?

Goldemberg: This is what is mentioned in the Brazilian nuclear accord; in other words, the accord with Germany does not mention the need for a transfer of eight powerplants. But according to the established model the transfer of eight powerplants would create an adequate components market. Now this is a technocratic noction of the problem; because in 1975 that model was based on the assumption that things would remain unchanged for 15 or 20 years; that is to say, the Brazilian model of development would not meet with any obstacles until 1990. In other words, the only thing required to make it difficult to justify the construction of so many nuclear powerplants was the failure of Brazilian development to register the growth rates of the miracle era.

The idea which cropped up in 1975, of making the nuclear industry vertical, seems to me to have been the fundamental error in the industrial strategy. And we are caught in this straitjacket. In other words, NUCLEBRAS set up NUCLEP in record time, and now, to make NUCLEP viable, Brazil needs to build one nuclear powerplant per year; something which is completely impossible. This is what needs to be changed. What needs a reform in this case is not Brazil, but rather the NUCLEBRAS timetables. Minister Cesar Cals is wrong when he claims that four or eight reactors are required to make a nuclear industry viable. From every indication, the Argentine nuclear industry is reasonably viable with two. And there may be others. But the others will appear as the needs for generating electricity become clearly marked.

The Program May Be Buried By Delay

FOLHA: In terms of cost, how much would a natural uranium plant represent in comparison with an enriched uranium one?

Goldemberg: The fact is that this is a rather uncomplicated matter. The natural uranium reactors are simpler than those using enriched uranium, and they are not much larger. The capital cost of a nuclear unit producing electricity which uses natural uranium is about 10-15 percent more than that of an enriched uranium reactor. However, the production of electricity ends up being cheaper, because it does not burn enriched fossil material.

FOLHA: Making a parallel between an enriched uranium powerplant and a natural uranium plant, what would the price of the installed power be in a plant of the second type?

Goldemberg: It would be $1,200 per kilowatt if it were built exactly on time. Obviously, if the plant were a natural uranium one, and was also delayed 6 or 7 years, it would be the financial resources that would raise the price. Consider Angra 1, which is virtually ready. Furnas published data showing that nearly $300 million of the $1.4 billion represented financial costs. Moreover, there are problems involving loss of profits; that is, the fact that the plant is not in operation means that the owner has stopped billing. It is like Itaipu. If, instead of starting to operate in 1983, Itaipu were to begin operating in 1990, the cost per installed kilowatt at Itaipu would be extremely high, because we would have to start paying the cost of the turbines within a short time. Hence, the delays in the Brazilian nuclear program are the results of its own gigantic proportions. They are acting as a very heavy burden, tending to bury the program itself as a result of a disproportionate increase in prices.

FOLHA: It has been commented that you are negotiating with the federal government on the new model for the nuclear program. We have been told that the proposal included a suggestion for stoppage of the work on Angra 2 and 3 projects, not constructing the Peruibe powerplants, the creation of a research institute for the development of natural uranium reactors, the scheduling of new powerplants after 1990 and the adoption of more nationalization for Angra 2 and 3, through the current revision of Brazil's contract with Germany. What would you care to say about this?

Goldemberg: Since I was, until recently, the head of the Brazilian Society for the Advancement of Science (SBPC), all the proposals from the scientific community concerning this matter are attributed to me. It is not true that I submitted this list of measures to the government. About a month ago, I met with General Venturini, and I met with other authorities previously; but what I explained to the authorities is the position of the scientists.

Throughout recent years, the annual meetings of the SBPC and the Brazilian Physical Society have produced important documents, and I have been the spokesmen for these claims.

There Is No Urgent Need for the Peruibe Projects

FOLHA: Basically, what was proposed?

Goldemberg: The scientists' position is quite realistic. Until 1970, the unanimous view among scientists was that Brazil could easily achieve self-sufficiency in the nuclear area; that is, master the technology and continue with the work that was being done with the natural uranium reactors. This would place Brazil in the historical line with India, Canada and Argentina. It was the purchase of the Angra 1 reactor from the American firm Westinghouse that demobilized the national effort in that field. Now that 10 years have elapsed, we think that it would be difficult to turn the clock back and begin everything again. The plan to build a reactor with local resources would hardly attract the interest of the Brazilian scientists. I think that many of them feel that there are very great commitments to Germany, and that those commitments must be kept insofar as Angra 2 and 3 are concerned. But, since they are considerably delayed, it is time to reorganize the NUCLEBRAS timetables and establish a plan to assimulate the German technology which is a system benefiting national industry. From this standpoint, the scientists' position coincides with that of the chairman of the National Confederation of Industries. The orders which are negotiated with Germany and which will cost us foreign exchange should be renegotiated and redistributed among the national industry.

After Angra 2 and 3, it is our view that the horizon should be kept open. There is absolutely no urgent need to begin projects in Peruibe. Furthermore, there is every indication that this is the opinion of the Sao Paulo government itself, and it seems to me to be a provocative maneuver to reopen the discussion of Peruibe which, after all has no means of being started during this government.

FOLHA: Another comment made is that you are nurturing political ambitions. Is that true?

Goldemberg: Since 1970, I have held the position of chairman, regional secretary or vice-chairman of the Brazilian scientific associations and, recently, SBPC, which is the major Brazilian scientific association. And, owing to these offices that I have held, I have been put in contact with government authorities. I have never left Sao Paulo University, but this does not mean that my name has not been considered on occasion for public positions. Two years ago, when Minister Delfim Neto was appointed minister of planning, he invited me to assume the chairmanship of the National Research Council (CNPq). In the end, my appointment did not materialize at that time.

FOLHA: Was it you who did not accept?

Goldemberg: No. It was something more complicated than that. I really hesitated to accept because it would not be very easy for me to move to Brasilia. I didn't think that it would be very beneficial to my own professional activity. But the National Research Council would have been a major challenge at the time; and the idea, at the time, was to dynamize this council and really put it in the service of the development of Brazilian science. I wavered slightly and, just as I hesitated, the offer also underwent vacillation of its own. So I finally ended up not being named to that position. During this 2-year period I held the chairmanship of the SBPC, and, all things considered, I believe that it was an advantageous substitution.

Goldemberg defends a reform

2909
CSO: 5100/2301

ITALY SIGNS ACCORD TO TRANSFER 'FAST-BREEDER' TECHNOLOGY

Rio de Janeiro GAZETA MERCANTIL in Portuguese 29 Jul 81 p 8

[Text] Today, Brazil has signed another nuclear accord, this time with Italy, to develop the technology for the rapid reactors, the so-called "fast-breeders" which consume plutonium. In Itamaraty, at 0930 hours, Prof Hervasio de Carvalho, chairman of the National Nuclear Energy Commission (CNEN), acting on behalf of Brazil, signed a government-level accord and a contract with the Italian firm, Italian Nuclear [Company] for Advanced Reactors (NIRA), for the sale of "sodium circuits" which will be operated by Brazilian technicians on the island of Fundao, in Rio de Janeiro. The price of the contract is $10.9 million.

This accord, which was negotiated during recent months, had been announced earlier by the minister of mines and energy, Cesar Cals; but the scientific, technical and industrial cooperation between the two countries in this nuclear field has been taking place since 1958, when the first accord was signed between the two governments. According to CNEN, in August 1971 a protocol was signed with the Italian National Nuclear Energy Commission, calling for, among other things, cooperation in the area of sodium technology applied to rapid reactors. The sodium is used as the cooling element for the rapid reactors, just as the light water is in the reactors purchased by Brazil from Germany. On behalf of Italy, the accord was signed by Umberto Colombo, chairman of the commission, and the contract was signed by engineer Giovanni Gambardella, president of NIRA.

During the 5-year duration of the accord, there will be training of Brazilian technicians in Italy, courses held in Brazil, training on the circuits to be supplied by NIRA and assistance for the installation of a "sodium storage unit." A text from CNEN explains that the purposes of the accord and the contract are that Italy will cooperate with Brazil in "the acquisition of basic information relating to experimental projects and groups dealing with liquid sodium, the gaining of the capacity to manage a sodium storage unit and to operate the sodium circuits independently, and the attainment of independence regarding experimental projects in the thermomechanical and thermohydraulic fields."

CNEN has been engaged in research in the area of rapid reactors on the island of Fundao since 1969, and constructed a sodium thermal circuit with a power of 100 kilowatts. According to the explanation from CNEN, its studies of the current international situation led the government to the conclusion that it was necessary to keep pace with the accelerated technological progress in the field. The commission claims that Italy's decision to become a partner in the acquisition of this information was a result of the fact that this country is in the "vanguard" for that process, both in terms of research and the industrial area. A consortium of Italian companies is constructing 40 percent of the equipment for the French Super-Phoenix, the only rapid reactor on a commercial scale being built in the world, which, according to the timetable, will be ready in 1984. NIRA, the firm that will be supplying the sodium circuits to Brazil, is a member of that consortium.

The lengthy text released to the press yesterday by CNEN to explain the accord points out that, "One feature of the rapid reactors lies in their ability to generate power while at the same time also producing more fuel than they consume." And it adds: "The uranium stocks already burned by the reactors in the United Kingdom amount to about 20,000 tons. If used in the rapid reactors, this volume would become equivalent to 40 billion tons of coal; in other words, 400 years of coal mining in the United Kingdom itself. In France, the current program for thermal powerplants will accumulate 250,000 tons of depleted uranium by the year 2000, representing an accumulation of energy greater than all the oil reserves in the free world." Thus, in its text, CNEN optimistically concludes that, during the 1980's, the commercial problems relating to rapid reactors will be solved, and they will be introduced on a large scale. But it was CNEN itself which published a chart showing that, of the eight countries developing the "fast-breeder" technology, only two plan to develop the reactor on a commercial scale: the United Kingdom, whose plant is only in the design stage; and France, with its Super-Phoenix. The other countries, even the Soviet Union and the United States, are confining themselves to experimental projects.

The accord with Italy is being signed at a time when doubts are recurring about the continuity of the accord already signed with Germany. The minister of energy and mines recently announced that only one plant would be constructed in Peruibe, Sao Paulo, instead of two, as scheduled. The day before yesterday, he corrected his previous statements.

2909
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NUCLEBRAS PRESIDENT NAMES SOUTHEAST AS POSSIBLE SITE OF SIX PLANTS

Rio de Janeiro JORNAL DO BRASIL in Portuguese 4 Aug 81 p 17

[Text] The six nuclear powerplants out of the eight in Brazil's accord with Germany that Brazil intends to construct by 1995 may be located in the southeast region. Sao Paulo, in particular, must have "more plants" in addition to the two planned on the Perube coast, because "the water resources available in the area will be depleted in the next 15 years." And if the Itaipu plant does not start operating in 1983, there will be rationing of electric power. Two of the plants in the accord are being built in Angra dos Reis.

This information comes from the president of NUCLEBRAS [Brazilian Nuclear Corporations], Ambassador Paulo Nogueira Batista. He admits the creation by the government of a new power company in Sao Paulo to operate the plants, in the event that CESP [Sao Paulo Power Company] does not consent promptly to run them and pay for them in 10 years. He also thinks that, in such an event, "Furnas could manage them."

Economic Crisis

According to the ambassador, the nuclear energy requirements cannot be gaged by the latest figures on energy consumption in the southeast region. Based on those numbers, by the end of this year the consumption will increase between 7 and 8 percent, as opposed to the 10.5 percent called for in ELETROBRAS' [Brazilian Electric Power Companies, Inc] Plan 95 for the decade.

He claims: "Brazil will not continue with this economic crisis, which is also a world crisis." Hence, with the depletion of its water resources, the country will need thermal supplementation. And, in such an instance, this would be done with nuclear power, because, "we must prepare the country for when the nuclear powerplants assume a preeminent role at the turn of the century."

The ambassador announced that the minister of mines and energy, Cesar Cals, was "mistaken" when he said that Sao Paulo would have only one nuclear powerplant next year (the minister made that statement to JORNAL DO BRASIL on 21 July, and reaffirmed it the next day at the War College). The president of NUCLEBRAS maintained that two nuclear powerplants will be built in Sao Paulo. For this purpose, NUCLEBRAS has already begun the preliminary geological studies on the site covering 230 square kilometers, where the plants will be constructed. He said that the construction work is due to begin between 1983 and 1984.

Regarding the cancellation of the contract with Norberto Odebrecht for the construction of Plant 3 at Angra dos Reis, the NUCLEBRAS president said that, this week, a notice would be published inviting construction firms to participate in the competitive bidding. He claimed that "it is not planned to have Norberto Odebrecht participate in the bidding," but the ambassador did not preclude the possibility of its entering the bidding for the two Sao Paulo plants.

He also reported that the winning firm in the bidding will have the same type of foreign technical assistance given to Norberto Odebrecht for the construction of Plant 2 at Angra dos Reis. As for the renegotiation of the contract for that plant, the president of NUCLEBRAS said that one of the changes is the conversion of the administration contract into a mere job contract.

Prices

Mr Paulo Nogueira reconfirmed the fact that the average price of the installed kilowatt in the Angra 2 and 3 plants will be $1,500 (direct cost), and the indirect cost will be $2,070. In the indirect costs, 38 percent will be added to the value of the plant.

He also stated that the participation of foreign capital in the construction of Plant 2 will be 70 percent in equipment, representing 50 percent of the total value of the unit. He thinks that this plant will prove to be cheaper than Plant 1 at Angra dos Reis, whose installed kilowatt currently costs $1,600.

He claims that the lower price is due mainly to the new type of contract for the construction of the plants that will be adopted by NUCON, a subsidiary of NUCLEBRAS: management and commitments regarding terms and prices for delivery of the projects; something which "will be happening for the first time in Brazil in projects of this kind."

The NUCLEBRAS president reaffirmed the fact that eight nuclear powerplants will be built in the country, and that the purchase of the equipment will be made in Germany on a decreasing scale. For example, Angra 2 and 3 of Angra dos Reis will have a nationalization index of 30 percent, and Nos 4 and 5 in Sao Paulo will have one of 55 percent.

In addition, he reported that the plants would be financed 100 percent by the government, and that the Brazilian Nuclear Program, including the purchase of the fuel cycle, would cost the nation $18 billion. The cycle will be complete in 1986.

Government Bears Cost of Nuclear Energy

In announcing that the water resources in the southeast region will be depleted by 1995, something which would warrant the construction of six nuclear powerplants (of the eight in the German-Brazilian accord), Ambassador Paulo Nogueira Batista, president of NUCLEBRAS, admitted that the government would be providing 100 percent of the financing for the construction of the nuclear units.

And there are some reasons for the government to bear the cost of the nuclear onus: the debt of the electric power companies, and the accumulation of projects by some of them, especially CESP [Sao Paulo Power Company].

The latter company, for example, has an investment of 60 billion cruzeiros for five new hydroelectric powerplants alone, and will increase its current 8,292 MW to 12,500, raising its capacity by over 50 percent. The new plants are: Porto Primavera, Rosana, Taquarucu, Nova Avanhandava and Tres Irmaos.

CESP, through Paulipetro, a consortium formed with IPT [Technological Research Institute], is also seeking oil in the Parana Basin. For this purpose, it signed 62 contracts for the providing of service, with a total price of over 26 billion cruzeiros.

As for Furnas, its market for electric power in the southeast and west-central regions showed a growth of 10 percent, which is 12 percent less than that recorded in 1979, according to its 1980 report, "owing to the slighter increment in industrial consumption." Furnas' participation in this market was 32 percent, less than that of the previous year, as a result of the 3 percent reduction due to the good hydrological conditions in the south and southeast regions.

Furnas is without doubt the most debt-ridden firm in the energy sector. Internally, it owes 62.4 billion cruzeiros and, externally, 133.8 billion cruzeiros, making a total of 196.2 billion cruzeiros. In 1980, the return on Furnas' investment amounted to 9.6 percent, a total of 150 million cruzeiros, an insufficient profit considering the minimal legal return of 10 percent.

2909
CSO: 5100/2301

BRIEFS

PROPOSED ENRICHED URANIUM PLANT--Brasilia--Yesterday, the minister of mines and energy, Cesar Cals, disclosed that he has submitted a plan to the government for the construction of a nuclear complex in Ceara, intended basically to export enriched uranium. The complex would include a uranium concentration plant, an enrichment plant and, to feed them, a nuclear electric plant. Minister Cals thinks that, since Ceara has in the Itataia region the largest Brazilian uranium deposit and one of the largest in the world, it is only natural to build that complex there. He said that a phosphoric acid concentration plant, also to be constructed on the site, will make use of the phosphate which occurs in association with the uranium ore, and will help to make the deposit economically feasible. In his arguments on behalf of the Ceara project, the minister explained that the construction of a 1.3 million kilowatt nuclear unit as part of the eight plants imported from the Federal Republic of Germany is justified not only by the anticipated consumption in the nuclear complex (the process adopted by Brazil for uranium enrichment is, of the three that are known, the one consuming the most electric power), but also by the fact that Fortaleza is the peak location of the CHESF (Sao Francisco Hydroelectric Company) transmission system, and a large-sized plant on the site would help to stabilize the line. He explained that, once the uranium concentrate has been produced for export, it would be only logical to carry out the other phases (conversion of the concentrate into uranium hexafluoride and its enrichment) locally as well, to export a richer raw material with high value on the international market. [Text] [Rio de Janeiro JORNAL DO BRASIL in Portuguese 5 Aug 81 p 17] 2909

CSO: 5100/2301

URANIUM EXPORTS FOR FIRST 6 MONTHS GIVEN

AB272043 Paris AFP in French 0859 GMT 27 Aug 81

[Excerpts] Niamey, 27 Aug (AFP)--According to the Official Gazette of the Republic of Niger, uranium export during the first 6 months of 1981 amounted to 4,846.9 tons ready for delivery to six countries during the year.

France is Niger's biggest customer with a total of 2,953.3 tons (notices dated 3 and 7 March) followed by Libya which imports 1,212 tons, Japan with 816 tons, Spain (300 tons), FRG (125 tons) and Iraq (100 tons).

Out of these six customers, four hold shares, through their affiliates in Niger's two uranium mining companies: SOMAIR (Open Cast Mining Company) and COMINAK (Akouta Mining Company).

With SOMAIR, Niger's partners are the following countries: France, (Nuclear Materials Company--26.9 percent; the French Uranium Company--11.7 percent; Minatone--7.5 percent; and Roiokta Company--7.5 percent); FRG (Uranggesselschaft--6.3 percent); Italy (AGIP Nuclear--6.5 percent).

In COMINAK, besides Onarem Company, the following countries are shareholders: France (COGEMA--34 percent), Japan (Overseas Uranium Resources Development--25 percent) and Spain (Empresa Nacional de Uranio--10 percent).

Thus, only two countries which have no capital shares in the two Niger uranium mining companies--Libya and Iraq--imported Niger uranium in 1981, through Onarem.

Analysis of the facts contained in the Official Gazette of the Republic of Niger shows that this is the first time that Iraq has bought uranium from Niger (Notice of 28 January 1981). However, Libya previously made purchases in 1978 (258 tons), in 1979 (150 tons) and in 1980 (180 tons). This, however, the first time that Libya which does not have processing facilities, has bought such a large amount of raw uranium (1,212 tons), economic observers stated.

The French imports (2,293.3 tons) also showed a net increase compared to 1979 (100 tons) and 1980 (1,344.3 tons). Japanese and Spanish imports have remained at the same level compared to the 2 previous years, while the FRG has reduced it needs by half between 1980 (250 tons) and 1981 (125 tons).

CSO: 5100/4958

NIGERIA

NUCLEAR CAPABILITY'S VALUE TO COUNTRY'S STATUS DISCUSSED

London WEST AFRICA in English No 3339, 27 Jul 81 pp 1685-1687

[Article by Dr Stephen Wright, Department of Political Science, University of Sokoto: "Limits of Nigeria's Power Overseas"]

[Excerpt]

The final issue to discuss in this brief survey concerns the debate within the country over whether or not to "go nuclear". *The Punch* of July 2 reported that the Ministry of Mines and Power had finally decided to go ahead with the nuclear programme using ₦10m. earmarked by the Federal Government for initial research and development. The debate over a nuclear programme has generated some controversy, but the majority of people appear to favour such a plan. Stripped to its crudest form, the logic is that Nigeria is a leading power, and as all leading powers by definition should be nuclear, so Nigeria should also go nuclear. There is also, of course, the military dimension. Neither the former Head of State, General Olusegun Obasanjo, nor President Shagari have bothered with normal diplomatic niceties, but have stated explicitly that Nigeria wants nuclear military firepower to combat and neutralise the nuclear weaponry of South Africa.

The possession of a nuclear capability may do much to raise the strength and bargaining position of Nigeria within Africa and the world as a whole, but there are many drawbacks which should be noted. The issue of "statues versus power" is again important, because possession of nuclear weapons, while conferring status, does not automatically give power. It is unlikely, for example, that relations with Britain or the US would change if Nigeria possessed nuclear weaponry, and yet it is through these relations that Nigeria's underdevelopment condition is maintained. Would Nigeria threaten a nuclear attack on the US or Britain or France?

If one turns to look at Nigerian-South African relations, then some intriguing questions arise. Possession of nuclear weapons of Nigeria is regarded as a way to deal with the obnoxious regime, but the realities of this should be considered. For anyone with any doubts concerning the limits to which the black sheep of the international community — South Africa and Israel — will go to maintain their survival, the Israeli destruction of Baghdad's nuclear reactor provides a useful lesson. If Nigeria's nuclear programme is specifically to fight South Africa, why should the apartheid regime not employ a similar tactic?

If one accepts the assumption that Nigeria will get to the stage of producing nuclear weapons — and whichever country supplies the technology and the enriched uranium will have to do some diplomatic somersaults to ignore the Non-Proliferation Treaty — there is the question of what type of weapon to produce. At present, there is rather a simplistic view that *the bomb* — a *deus ex machina* — is all that is needed and there is little thought as to its sophistication, delivery or power.

To take just one issue — though a crucial one — of the type of weapon, it is important to consider the implications of having tactical or strategic nuclear weapons. If Nigeria were to build tactical or smaller, weapons, then these would probably have to be located somewhere in the front-line states. It is fairly safe to predict that none of the front-line states would want nuclear weapons based on their soil for fear of retaliation by South Africa, or for fear of nuclear devastation.

The possession of strategic nuclear missiles based in Nigeria and trained on South Africa presents an equally difficult problem. What has generally been ignored is the fundamental fact that South Africa is not a white country, but a black country, where non-whites constitute around 80 per cent of the population. If a future nuclear confrontation were to arise, would any Nigerian President risk the destruction not only of Nigeria, but also of the very people in South Africa whom he is supposed to be liberating? Such a question may not prevent Nigeria from going nuclear, but may well affect the credibility of its future nuclear policy.

In conclusion, it is necessary to state that the aim here has not been to paint too bleak a picture of the constraints and limitation on Nigerian foreign policy, because it is evident that the country does play a major role in the international system. The aim, however, has been to point to some of the factors responsible for the apparent lack of success in foreign policy. No real distinction has been made between the Obasanjo and Shagari administrations in the field of foreign policy because, in broad terms, none exists. If anything, the problems facing the Shagari government are greater because of the increasingly unfavourable external environment, as well as the domestic pressures from the competitive and volatile party system. Given these increased constraints, it is even more imperative to define and reorientate Nigerian foreign policy in order to attempt to match rhetoric with action.

CSO: 5100/4955

BRIEFS

DENMARK PLAN IF SWEDISH N-ACCIDENT--Six years after the start of the Barsebak plant a real alarm system has now been set up for the Danish public in the event of a serious nuclear power accident. The catastrophe signal will be sent out by the "Wednesday siren" which will issue three blasts of 12 seconds duration two times in the threatened area as a signal that everyone should go inside and turn on the radio. Civil defense sirens are set up in all larger towns and can be heard each Wednesday at noon during the weekly test blast. The people who live outside the areas covered by the sirens will be alerted by loudspeakers in police cars. The alarm arrangements were worked out by the Civil Defense Agency in co-operation with Danish Radio, the police and environmental and health agencies. The total revision of the emergency plan dating from the mid-1970's will come out later. Currently the Environmental Agency's proposed revision is awaiting the approval of the Ministry of Environmental Affairs. [Text] [Copenhagen BERLINGSKE TIDENDE in Danish 31 Jul 81 p 2] 6578

CSO: 5100/2310

NUCLEAR COOPERATION WITH LIBYA, OTHER ARAB COUNTRIES

Brussels LE SOIR in French 8 Aug 81 p 2

[Article by Guy Duplat: "Possible Breakthrough in Belgian Nuclear Cooperation with Arab Countries"]

[Text] Belgian engineers have completed a safety study of a Russian nuclear reactor that may be purchased by Libya! And Belgium has high hopes that Libya will continue to use its services to help that North African country expand its civilian nuclear power program.

These somewhat surprising contracts must be viewed within the context of the worldwide effort which Belgatom, a Belgium firm, is making to market nuclear power technology. For purposes of foreign contracts, Belgatom is a consortium of three Belgian companies: Belgonucleaire, Electrobel, and Traction-Electricite.

Relatively large contracts have already been received from Taiwan and South Korea, the latter for 1 year's intensive training of Korean nuclear technicians. But Belgatom also entertains earnest hopes of obtaining contracts from Arab countries. The latter are rightly concerned about preparing themselves for the "post-oil" era and are, therefore, seriously thinking of initiating large-scale civilian nuclear power programs.

An Algerian mission visited Belgium recently and it is hoped that an initial contract may be signed in September for reportedly the study of a possible nuclear power plant site in Algeria. We also know that Belgatom is a favorable position to have the Syrian Government accept its bid on a general feasibility study of Syria's electric power system. Furthermore, Belgonucleaire has a contract for the restart-up of a Turkish reactor.

The best chance for contracts could, however, be with the Libyan Government.

Belgonucleaire has had a long-standing open-end technical consultant contract with the Libyan Atomic Commission. Under this contract, Belgian technicians advised their Libyan counterparts--most of whom were trained in the United States, France, and Germany--on the choice of Libya's first nuclear research reactor. Libya chose a Russian reactor and construction of the research center at Tajura--similar to our research center at Mol--is nearing completion. Belgian engineers have been consulted on this project many times. Belgonucleaire's open-end contract was transferred to Belgatom when Belgonucleaire joined that industrial group 3 years ago.

For several years, Libya has wanted to advance into a new phase of its nuclear power program by ordering a nuclear power plant generating electricity to be used for the desalination of sea water, thereby supplying essential water for the irrigation of fertile but dry Libyan lands.

Libya first approached Western countries about such a plant. Though they were prepared to furnish the power plant, these countries did not wish to enter into long-term contracts for supplying nuclear fuel, and this for obvious political reasons. The Russians, however, lost no time in accepting this clause. The Russians proposed a 400-megawatt power plant of the same type as one they had already built in Finland and were to install in Syria.

Press Made Finns Lose Contract

The Libyans wanted to assure themselves that the Russian plant met those safety standards regularly maintained in Western countries. They therefore, thought of the Finns who already had had a Russian plant and an American plant built in their country and, therefore, seemed to be in the best position to make this safety analysis of the future Russian power plant.

The Finnish press got wind of this, made a stir about it, and merely succeeded in scaring off the Libyans. The latter then turned to the Belgians who had been their faithful advisers for years.

Exclusively Peaceful Use

This first safety study has been completed. It is but a preliminary analysis inasmuch as the Russian-Libyan contract has still not been signed. Some 12 Belgian engineers worked more than a year on the study. These engineers form part of the teams building the Doel and Tihange nuclear power stations. In that capacity, their work is inspected by the regulatory agency Vincotte. But for the purposes of this Libyan contract, instead of being subject to inspection, these engineers have themselves become the inspectors!

This safety analysis is very preliminary also because the Russians have supplied the data absolutely necessary for such a study in merely dribs and drabs.

This first small Belgian-Libyan contract could lead to others in coming months and the Belgians still hope to receive much larger contracts once purchase of the Russian power plant is confirmed.

The Belgians are, of course, cautious about such contracts. They realize that nuclear contracts with Arab countries are a ticklish matter since the bombing of the Iraqi reactor or because of such fanciful and baseless novels as the "Fifth Horseman." Belgatom does, of course, request authorization from the Ministry of Foreign Affairs before negotiating any nuclear contract. It also rigorously complies with the export ban on any technology or information having to do with uranium enrichment, irradiated fuel reprocessing or plutonium processing, all products that could lead to nuclear weapons proliferation. All approved nuclear contracts are, therefore, exclusively for peaceful use.

Furthermore, Belgium deals solely with countries that permit the International Atomic Energy Agency in Vienna to inspect their nuclear installations. Libya does grant that agency such access. Fully complying with the agency's safeguards and restrictions, the highly competent Belgian nuclear industry must of necessity expand into foreign markets if it does not want its business to go to seed.

These same Belgian "nuclear" firms do, however, provide other services. For example, Belgonucleaire has been awarded a contract for the installation of a small 10-kilowatt solar power station in Borj Sedria, Tunisia. Admittedly this is a small contract, but it can serve as a pilot project. Moreover, it is of interest to other Belgian firms inasmuch as IDE, the Walloon solar panel company, has been able to sell the Tunisians a license for its panels.

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 113

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WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 113

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ACTU PRESIDENT URGES MORE ANTI-NUCLEAR PROTESTS

Melbourne THE AGE in English 3 Aug 81 p 3

[Article by Paul Chadwick]

[Text]

The president of the ACTU, Mr Dolan, yesterday called on the union movement to step up industrial action in the uranium industry as a way of discouraging investors.

Union action to delay mining and export operations would increase costs and force companies already in the industry to reconsider their investment. Those planning to invest would have second thoughts, Mr Dolan said.

The world price for uranium had become more competitive as countries, including France and Japan, reconsidered the worth of nuclear energy. This had forced investors to "really do their sums" when costing planned developments, he said.

Mr Dolan was commenting on a speech he made on Saturday night at a dinner organised by the Movement Against Uranium Mining to open Nuclear-Free Australia Week.

During his address Mr. Dolan said he was concerned and disappointed that the union movement had not achieved more to stop uranium mining since the ACTU congress adopted a policy opposing mining and export in 1979.

Mr Dolan said there was and would continue to be "a greater and better involvement by the trade union movement in this campaign to completely halt the mining of Australian uranium."

Mr Dolan called on unionists to pursue the anti-uranium policy "with all your vigor" and to influence "not only your fellow workers, but the officers of your union to do something a little more positive".

"Industrial strife that can hold up construction of mining sites, development of mines and finally the export of uranium so produced, means that the added cost of that will be seriously considered by these prospective producers, suppliers and investors. And in that way I think a great deal can be contributed to our cause," he said.

The anti-uranium policy seems certain to be discussed at the next ACTU congress next month. Mr Dolan said yesterday it was not yet on the agenda to his knowledge and had not been raised in executive meetings.

Mr Dolan was the major force behind adoption of the policy by the 1979 congress when former president, Mr Bob Hawke, opposed it. Mr Hawke said then that the last thing the Australian union movement needed was a national Newport and the unions would look "bloody stupid" when it found their bans would not work.

Mr Dolan said yesterday that Mr Hawke had been proved correct "to the extent that at this time there hasn't been a massive rejection of uranium mining". But there was a long way to go with the issue and people would be examining it for the next 20 years, he said. It was not like the building of a power station (Newport).

Little scope

Mr Dolan said that because the congress was a policy-making body, there was little scope for it to ensure that members complied with the uranium policy. The ACTU was not authoritarian, he said. "The congress determines all sorts of policies and many unions don't actively pursue them and, in fact, disregard them."

In his speech on Saturday Mr Dolan said workers who were employed in uranium mines were not considering the problems they were contributing to. There were "unfortunately" unions which did not believe there were any problems associated with uranium mining, others which were not convinced but did not think anything could be done and still others which saw employment opportunities for their members.

CSO: 5100/7552

BRIEFS

NUCLEAR WASTE STORAGE--Melbourne--A world authority on radioactive waste disposal said yesterday that Australia could help to resolve the nuclear proliferation controversy by establishing a uranium reprocessing industry. Professor A. E. Ringwood, who developed the "synroc" (synthetic rock) disposal system, said that if Australia controlled the plutonium extracted from its uranium it could impose safeguards and ensure its peaceful use. Professor Ringwood, director of the research school of earth science at the Australian National University, said that synthetic-rock canisters could safely store nuclear waste in the ground for millions of years. The development meant that the problem of disposal could no longer justify abandonment of nuclear power programmes internationally. Nor could the storage of waste in Australian soil be reasonably used to justify a refusal to mine and export uranium to countries that wanted it. Australia could establish a reprocessing plant for nuclear fuel from foreign reactors. This would accept foreign fuel rods, reprocess them, extract the radioactive waste and convert them into synthetic rock, he said. After a period the synthetic rock would be returned to the country of origin for disposal. Professor Ringwood said that nuclear safeguards were enough to establish a pilot reprocessing plant in Australia at a cost of about $1.5 million for the first 18 months. [Text] [Perth THE WEST AUSTRALIAN in English 29 Jul 81 p 5]

MARY KATHLEEN OUTPUT--Mary Kathleen Uranium Ltd's uranium oxide output for the first half of 1981 was 395.1 tonnes after the June quarter production recovered to 224.9 tonnes from the March quarter's strike and weather-affected level of 107.2 tonnes. The six months' total is 7.4 per cent ahead of the 367.8 tonnes produced in the first half of 1980 but 15.3 per cent less than the 466.7 tonnes produced in the second half. June half-year earnings, due to be announced late in August, stand to be less than last year's $6.02 million in spite of the higher output. MKU's chairman, Jr J.L. Liebelt, warned the April annual meeting that 1981 profits would be affected by lower uranium oxide prices, substantially higher prices for fuel and supplies, increased costs in deepening the pit and expectations that production would exceed sales. He said that average prices for 1981 deliveries of uranium oxide would be 15 per cent lower in real terms than those for 1980. MKU became liable for income-tax payments in 1980 after wiping out its accumulated losses leaving it with net earnings for the full year of $11.15 million against $17.34 million for 1979. [Text] [Sydney THE SYDNEY MORNING HERALD in English 30 Jul 81 p 22]

CSO: 5100/7552

TARAPUR PLANT CAN BE RUN WITH MIXED OXIDE FUEL

Madras THE HINDU in English 29 Jul 81 p 9

[Article by G. K. Reddy]

[Text] New Delhi, July 28. The U.S. Assistant Secretary of State, Mr James Malone, is arriving on Thursday morning accompanied by some legal and technical experts for two days of intensive talks with India on the future of the Tarapur agreement.

He will be joined by the American Ambassador to Bangladesh, Mr David Schneider, who is taking over shortly as Deputy Assistant Secretary of State in charge of the South Asian region.

The Indian delegation to these crucial talks will consist of the Secretary in the External Affairs Ministry, Mr Eric Gonsalves, and the Chairman of the Atomic Energy Commission, Dr H. N. Sethna, who conducted the last round of discussions in Washington.

There has been no indication from the U.S. side whether Mr Malone is going to take a tougher stand on the question of safeguards in pursuance of the so-called non-proliferation objectives prescribed by President Reagan in his recent policy statement. The fact sheet released by the White House as a supplement to the President's statement spoke rather ominously of the Reagan Administration's resolve to "consider the range of U.S. diplomatic, economic and national security tools to reduce the motivations of other nations to develop nuclear explosives."

At the Washington talks in April last, the U.S. stated in no uncertain terms that it would like to terminate the Tarapur agreement, while insisting on the continuance of the safeguards as part of an international obligation. The Indian delegation rebutted the American contention with the plea that it was quite clear from the wording of the relevant clause that the safeguards would automatically lapse with the termination of the agreement for whatever reason.

There was no substantive discussion as such at the last round of talks on the merits of the respective positions. Nor was any serious effort made at that stage to explore the possibilities of evolving a compromise on how best to ensure a decent burial of the ill-fated agreement, without getting involved in another distasteful controversy over the consequences of its termination.

Talks To Abrogate Accord

The present meeting in Delhi was arranged to commence the actual negotiations for ending the fuel supply agreement if the U.S. was no longer able to fulfill the commitment in terms of its domestic legislation. But it is highly unlikely that these highly complex discussions, involving political, legal and technical aspects of termination, can be concluded within two days even assuming that the two sides were equally keen on completing this agonising exercise.

As this is too serious a matter to be sorted out in the course of one round of negotiations, it is more likely that the talks would be adjourned, after the Indian and U.S. delegations have exchanged views on the modalities of termination. If the intention is to avoid a breakdown, the dialogue has to be kept going until they are able to work out a mutually agreeable position.

Successful Tests

As far as India is concerned, it has been made amply clear to the U.S. that the Tarapur plant will be run at any cost. The tests carried out at Trombay with mixed oxide fuel have proved successful and Indian atomic scientists are satisfied that it should be possible to operate the Tarapur reactors initially with a combination of fuel elements fabricated from enriched uranium and mixed plutonium oxide, which can be progressively increased to the point of replacing imported uranium with indigenously made mixed oxide.

If any unforeseen technical snags develop during complete changeover to mixed oxide fuel, India can obtain enriched uranium from the Soviet Union. This stand-by offer is being kept open to meet such a contingency as part of an interim arrangement.

The U.S. knows that, much as it would like to continue the present fuel supply agreement, India is not altogether at its mercy for running the Tarapur plant. The whole issue of amicable termination, therefore, hinges on the differing interpretations of the safeguard obligations after the abrogation of the agreement.

Arm-Twisting Will Back-Fire

It remains to be seen whether the U.S. is going to resort to political or economic measures, as hinted in the White House fact sheet, to compel India to continue the safeguards on the Tarapur installations and spent fuel even after the termination of the agreement. If it attempts to do any arm-twisting to secure India's compliance, the whole effort might back-fire leading to grave consequences.

The State Department has been cautioning that the Reagan Administration cannot afford to show any special consideration in India's case, since it would be faced with adverse Congressional reaction. And in putting forward this apologia to justify its totally one-sided and highly discriminatory approach to the whole question of proliferation, the U.S. tends to overlook conveniently the fact that Mrs Gandhi also has parliamentary and public opinion to contend with in justifying any concessions on the safeguards question.

CSO: 5100/7133

NATION CONSIDERS RETURN OF SPENT FUEL TO UNITED STATES

Madras THE HINDU in English 2 Aug 81 p 12

[Article by G. K. Reddy]

[Text]

NEW DELHI, Aug. 1

One of the suggestions that might be considered at the next round of Indo-American talks on Tarapur is the possibility of returning the spent nuclear fuel to the U.S. to get over the controversy on the demand for continuance of safeguards even after the termination of the agreement.

Though no formal offer to this effect was made during the two-day discussions in Delhi, the pros and cons of the proposition have been considered by India at the appropriate political and technical levels as a lesser evil in this tangled situation.

The Indian title to the spent fuel has never been in dispute, since the U.S. itself has on more than one occasion acknowledged it.

What is now in dispute is the safeguardability of the accumulated fuel wastes after the termination of the agreement, whether by mutual consent or through unilateral abrogation.

The 1963 agreement stipulates that in the event of termination of the accord by either side, the U.S. will be entitled to ask for the return on payment of all nuclear materials supplied by it.

But this option cannot be invoked in the present context involving a breach of contract which is different from termination of the agreement.

Not legally bound: So India will not be legally bound to return the spent fuel, if it did not want to give up the right to retain it, since the U.S. attempt to withhold the supply of enriched uranium amounts to a violation of the agreement as different from its termination.

It can, however, offer to return the spent fuel on purely political considerations, as the best way out of the controversy on safeguards, to remove a major irritant from Indo-American relations.

The U.S. has been maintaining on the other hand that there has only been a delay in shipments and not a denial of the fuel requirements. It claims to have been complying with the "as needed provision in the sense that at no stage was India compelled to close down the Tarapur plant due to fuel shortage.

The 1963 agreement provided for reprocessing the spent fuel at Tarapur itself in a plant built by India on U.S. approved specifications.

It entitled India to retain a portion of the plutonium obtained through reprocessing to meet its requirements and return the rest to the U.S. on payment.

A few years ago when it started dragging its feet over the "safeguardability" of the reprocessing operation through "joint determination", the U.S. suggested that perhaps it would be more economical for India to send back the spent fuel for reprocessing in an American plant and purchase only such quantities of plutonium as required for its legitimate uses.

The acceptance of this suggestion would have meant virtually shutting down the reprocessing plant at Tarapur built at considerable expense.

American bluff: But India decided to call the American bluff and readily agreed to return the accumulated fuel wastes. It was the U.S. which went back on its earlier suggestion with the execuse that the transportation of this highly radio-active material weighing nearly 200 tonnes would pose problems, besides bringing the administration into conflict with the environmentalists in the U.S.

Since then the U.S. has been exploring the possibilities of getting the spent fuel of American-built nuclear plants in various countries reprocessed abroad on payment.

But there is no definite information yet whether countries like Britain, France or Japan would be prepared to undertake such a task on behalf of the U.S., if India agrees to return the spent fuel despite its unquestionable legal title to it.

The Indian contention is that the safeguards would automatically lapse in the event of an abrogation of the agreement if the U.S. failed to meet its contractual obligations.

It could very well declare the agreement null and void on the basis of the material breach already committed by the U.S. in inordinately delaying the fuel supplies, amounting to a denial for all practical purposes.

The Government does not propose to carry this argument to the logical conclusion of running the risk of an unnecessary break with the U.S.

CSO: 5100/7138

CORRESPONDENT REPORTS TARAPUR TALKS INCONCLUSIVE

Madras THE HINDU in English 1 Aug 81 p 1

[Article by G. K. Reddy]

[Text]

NEW DELHI, July 31

As expected, the Indo-U.S. talks on Tarapur ended inconclusively today with an understanding that the two sides should meet in Washington in the near future to continue the discussions on what was described as an "amicable abrogation" of the agreement.

There was no meeting ground at all between the Indian and U.S. positions on the key issue of continuance of safeguards after the termination of the fuel supply agreement.

The Indian delegation maintained that the agreement would stand termination if the U.S. broke its contractual obligation to supply enriched uranium for running the plant. The repudiation of a solemn and binding commitment by the U.S. would free India from the prescribed safeguards in the infringed agreement.

The American side, on the other hand, continued to argue that, in matters of a sensitive nature like the supply of nuclear fuel, the abrogation of an agreement by one party for whatever reason would not automatically absolve the other party of the responsibility of adhering to the existing safeguards on materials already provided under the agreement.

So the whole accent of the U.S. at these talks was on termination of the agreement by mutual consent, and not through any unilateral action on its part, so that the very process of abrogation would provide for retention of safeguards in some form on the nuclear equipment and materials supplied for the Tarapur plant.

It meant that the present safeguards on the spent fuel should continue even after the termination of the agreement to ensure U.S. control on the plutonium derived from reprocessing it.

Political Attitudes: In reiterating their respective positions on this key issue, the Indian and U.S. delegations tried to first size up each other's political attitudes to assess how far they were prepared to go in terminating the agreement without embarassement to either side.

But in the course of these discussions no new negotiating elements emerged for carrying forward the dialogue from a mutually acceptable starting point.

An Indian spokesman later reaffirmed the Government's determination to keep the Tarapur plant going despite the refusal of the U.S. to continue the fuel supplies for it.

He asserted India had the exclusive right to the spent fuel and was free to reprocess it. He said no offer was made by the U.S. at these talks to release the pending fuel shipments before the termination of the agreement.

The talks got bogged down over the differing concepts of the two countries on the scope of the initial U.S. commitment to keep up the fuel supplies and the concomitant Indian obligation to ensure the safeguardability of the spent fuel even after the termination of the agreement.

There was no opportunity for the U.S. to pursue its earlier bid to extract a firm assurance from India that it would not conduct any more tests with the ploy of releasing the second of the two shipments approved by the Carter Administration.

The farthest that India was prepared to go was to restate in an appropriate context the oft-repeated stand that it retained the right to carry out further tests, as and when required for harnessing nuclear energy for peaceful purposes, although it had no intention of doing so in the near future.

It could not go beyond this general assurance, consistent with the country's strong opposition to the highly discriminatory attempts of the nuclear powers to deny others even the opportunity to engage in peaceful research in the name of non-proliferation.

Double standards: The Indian side did not also let go the opportunity to rub in the point as politely as possible, but in quite unmistakable terms, the double standards the Reagan administration was adopting in turning a blind eye at Pakistan's avowedly militaristic nuclear programme, while exerting pressures on India to submit to unacceptable constraints even on peaceful uses.

But the U.S. made no bones about the inherent contradictions of its nuclear policy since it formed a part and parcel of its new security concerns, which compelled the present administration to draw a distinction between its allies and other nations.

The leader of the U.S. team, Mr. James Malone, made no secret of the American desire to terminate the Tarapur agreement through mutual consent and agreement, instead of abrogating the accord by breaking it.

He was keen that India should cooperate in evolving a compromise on the question of safeguards, so that the two countries could live with it without embarrassement to either of them.

The door was left open for further discussions, since both sides wanted to avoid a breakdown of the negotiations. They were equally careful that this controversy should not affect the other aspects of Indo-American bilateral relations.

It was in this context that the Indian spokesman announced at the end of the talks today that it was agreed to hold another round of talks to resolve this problem in a "constructive spirit" as he put it.

CSO: 5100/7135

PAPER HOPES FOR 'QUIET BURIAL' OF TARAPUR AGREEMENT

New Delhi PATRIOT in English 3 Aug 81 p 2

[Editorial]

[Text] SO on to Washington and, hopefully, a quiet burial of a contentious agreement. Hopefully, because there is a lingering fear in the Indian mind that the US, which at every step has sought to lay snares by which to trap this country into an unequal arrangement, will still try to bind it down to a limited exercise of its sovereign rights. Using its preeminent position as a supplier of nuclear material, the US has tried to fence India and tie it with the discriminatory Non-Proliferation Treaty. Having failed, it held on to successive shipments of enriched uranium for the Tarapur plant to force this country to eschew peaceful nuclear explosions — which are recognised as legitimate by the International Atomic Energy Agency — or otherwise give an earnest of good behaviour by putting all India's nuclear facilities under "full-scope" safeguards. In fact, the US has still to deliver one shipment of 19.8 tonnes of fuel which both its President and Congress had cleared. It has also tried to hold India culpable of violating an international agreement. In all these gambits it was thwarted by India's insistence that the US adhere to its contractual obligations under international law.

But it still wants to eat its cake and have it too. Residual to the nuclear cooperation agreement between the two countries is approximately 260 kg tonnes of spent fuel rods. The US does not want India to reprocess the rods to extract plutonium. Inspired reports in US newspapers also indicate that the US would also not like to see India acquiring slightly enriched uranium from other sources to run the Tarapur power plant to optimum capacity. There have been oblique hints that Tarapur should continue to be under international safeguards even after the cooperation agreement is repudiated as was done by India in the case of the Rajasthan project after the Canadians ended their agreement with this country. That step was taken to reassure the world and the Canadians in particular that India was not on the road to becoming a nuclear weapons power. That was an independent act of a sovereign nation not dictated by external powers as is now sought to be done in the case of Tarapur. It is necessary to clear the fog before India decides to buy fuel for Tarapur from elsewhere. The Soviet Union or any other country will necessarily apply the known IAEA safeguards to the nuclear material it supplies. Thus India is not shrinking from safeguards. What it wants is an assured supply of fuel.

So we move on to Washington with the perspective clear that if the agreement is to end it will be a clean and complete break. If there is to be no obligation on the part of the US to supply fuel as stipulated under the 1963 agreement then there can be no limitations on India on how it runs Tarapur and what it does with the spent fuel rods that have piled up there due to US default. There is the added perception that the issue cannot be dragged along without solution any longer. This country has made it clear that the Washington meeting will be the last and that it wants a quiet transition. However, signals from the US are not so reassuring. There is the possibility that it may insist that there is no immediate need for fuel for Tarapur because the available stock will keep the plant running up to early 1983 and that India can wait. If this country refuses to wait and goes ahead with reprocessing the spent fuel rods or buys fuel from elsewhere the US will shift the onus of undermining the agreement on to its shoulders. The element of urgency for us arises from the fact that if the plutonium from the spent fuel cannot be used for making bombs it would be useful in initiating India's fast breeder reactor programme, the key to its dream of utilising the thorium fuel of which it has the world's largest reserves. The US delaying tactics are meant to tie India to the concept of limited sovereignty in a crucial frontier discipline. India has to defeat all attempts to curtail its sovereignty and strike a blow at blatant neo-colonialism by making whatever sacrifices that become necessary in its advance towards self-reliance in nuclear energy.

CSO: 5100/7140

NUCLEAR ENERGY 'CIRCLES' DEFEND RIGHT TO TARAPUR FUEL

Calcutta THE STATESMAN in English 3 Aug 81 p 13

[Text]

BOMBAY, Aug. 2—India is "fully within its rights" to claim title to the spent fuel at the Tarapur atomic power station now that the nuclear pact with the USA is on the verge of being abrogated, according to atomic energy circles here, reports UNI.

They felt that the spent fuel, which has created storage problems, naturally belonged to India since the USA had not expressed its intention to buy it as required under the pact.

They said it was uneconomical for the USA to buy the spent fuel from India and transport it back home. "They have to pay for taking back the spent fuel because the enriched uranium sold to us naturally becomes our property".

The relevant portion in the Indo-U.S. nuclear pact of 1963 says: "In the event of termination (of the pact) by either party, the Government of India shall, at the request of the Government of the United States of America, return to the Government of the United States of America all special nuclear materials received pursuant to this agreement and in its possession or in the possession of persons under its jurisdiction. The Government of the United States of America will compensate the Government of India for such returned material at the current schedule of prices then in effect domestically".

Laying down the procedure for its termination, the agreement says: "Before either party takes steps to terminate, the parties will carefully consider the economic effect of any such termination'

The USA had consistently been violating the pact by not regularly supplying the required quantity of enriched uranium and thus affecting the working of the Tarapur power station.

The pact itself lays down that "the United States (atomic energy) Commission will sell to the Government of India and the Government of India will purchase from the United States Commission, as needed, all its requirements for enriched uranium for use as fuel at the Tarapur power station, it being understood that the Tarapur atomic power station shall be operated by no other special nuclear material than that made available by the United States Commission and special nuclear material produced therefrom".

Referring to the reported move by the U.S. Government to make India subject all its nuclear plants to safeguards as a precondition to resuming fuel shipments to Tarapur, the circles noted that "there is no provision in the pact for such extraneous conditions".

Deliberate delays in the shipments by the USA not withstanding, India has strictly adhered to the provisions of the agreements even at the risk of running the power plant below its capacity.

CSO: 5100/7139

BOMB LOBBY MEMBER WARNS AGAINST COMPLACENCY

Bombay THE TIMES OF INDIA in English 2 Aug 81 p 13

[Text] Chandigarh, August 1: Mr Krishan Kant, former Janata MP, has warned the nation against complacence on the question of acquiring a deterrent nuclear potential in the face of persistent reports indicating that Pakistan would explode her nuclear device by 1982.

Mr Krishan Kant, who is identified with the pro-bomb lobby in his party, expressed concern over what he called a "slide-back" in India's preparations to keep pace with the Pakistani nuclear weapons programme.

He told newsmen that India had lost much valuable time since its Pokharan exploration in 1974 in going ahead with the manufacture of the nuclear bomb. Pakistan had gone ahead with its programme of building up her missile materials.

The armed forces would require several years of training and practice in operating a deterrent nuclear weapons system. Hence, mere acquisition of nuclear capability would not be enough. "We have to give the armed forces the requisite time," he added. If India could go nuclear earlier, nuclear weapons would become part of her defence equipment, he said.

He said latest statement of the Prime Minister was contradictory to the earlier one she had made in the Lok Sabha in reply to the defence debate. In the house she sought to create a different impression by saying that India would do "whatever is necessary if Pakistan exploded the nuclear device."

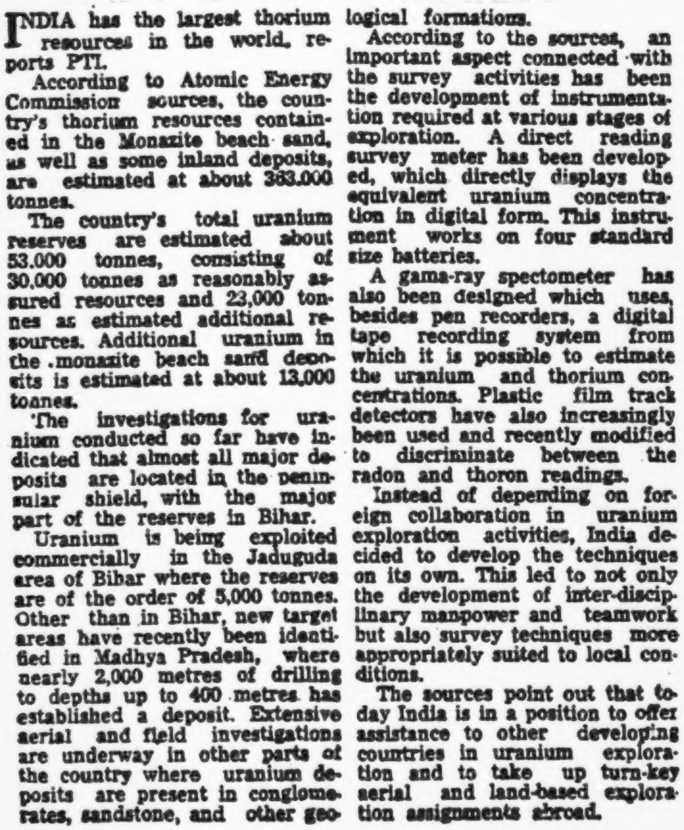
He said Pakistan had deliberately decided to go in for nuclear weapons technology after coming to the conclusion that she could not outmatch India in a conventional war.

CSO: 5100/7137

SEARCH FOR URANIUM, THORIUM RESOURCES SUCCESSFUL

New Delhi PATRIOT in English 27 Jul 81 p 8

[Text]



INDIA has the largest thorium resources in the world, reports PTI.

According to Atomic Energy Commission sources, the country's thorium resources contained in the Monazite beach sand, as well as some inland deposits, are estimated at about 363.000 tonnes.

The country's total uranium reserves are estimated about 53.000 tonnes, consisting of 30,000 tonnes as reasonably assured resources and 23,000 tonnes as estimated additional resources. Additional uranium in the .monazite beach sand deposits is estimated at about 13,000 tonnes.

'The investigations for uranium conducted so far have indicated that almost all major deposits are located in the peninsular shield, with the major part of the reserves in Bihar.

Uranium is being exploited commercially in the Jaduguda area of Bihar where the reserves are of the order of 5,000 tonnes. Other than in Bihar, new target areas have recently been identified in Madhya Pradesh, where nearly 2,000 metres of drilling to depths up to 400 metres has established a deposit. Extensive aerial and field investigations are underway in other parts of the country where uranium deposits are present in conglomerates, sandstone, and other geological formations.

According to the sources, an important aspect connected with the survey activities has been the development of instrumentation required at various stages of exploration. A direct reading survey meter has been developed, which directly displays the equivalent uranium concentration in digital form. This instrument works on four standard size batteries.

A gama-ray spectometer has also been designed which uses, besides pen recorders, a digital tape recording system from which it is possible to estimate the uranium and thorium concentrations. Plastic film track detectors have also increasingly been used and recently modified to discriminate between the radon and thoron readings.

Instead of depending on foreign collaboration in uranium exploration activities, India decided to develop the techniques on its own. This led to not only the development of inter-disciplinary manpower and teamwork but also survey techniques more appropriately suited to local conditions.

The sources point out that today India is in a position to offer assistance to other developing countries in uranium exploration and to take up turn-key aerial and land-based exploration assignments abroad.

CSO: 5100/7132

INDIAN RARE EARTHS LTD EXPLAINS WASTE DISPOSAL

Bombay THE TIMES OF INDIA in English 30 Jul 81 p 14

[Article by K. P. Krishnanunny]

[Text]

COCHIN, July 29.

INDIAN Rare Earths Ltd., a division of the Department of Atomic Energy, has sought to allay in a counter-affidavit filed in the Kerala high court the fears of Eloor Panchayat samiti that the nuclear wastes stored in its premises posed any health hazards.

The counter-affidavit has been filed by IRE in reply to the panchayat's petition seeking a writ to restrain the unit from depositing the nuclear wastes in concrete containers and storing them in the company premises. The panchayat, in whose area IRE is located, has also demanded the removal of the wastes to a safer place.

According to IRE, the nuclear wastes, emanating in the processing of thorium production have been kept in 2,700 casks in specially-designed RCC trenches, thus shielding any radiation.

The safety of IRE workers and the surrounding population is guaranteed by the health physics division of the DAE. A survey team of the division makes periodic tests to ensure that radioactivity conforms to the stipulated safe limits.

Besides, a health physicist of the Bhabha Atomic Research Centre has been posted at the premises as radiological safety officer, He also keeps a check on the radioactivity and reports to the competent authority of the BARC on his findings.

According to IRE, the nuclear wastes, produced during the processing of monazites, are in the form of lead sulphide and barium sulphate, carrying minute quantities of radioactive radium. A major portion of this (about 80 per cent) radium is short-lived, its half-life period being six years. In other words, its activity is reduced to half its present strength in six years.

Being in a sulphate form, the radium in the waste is in an insoluble state.

The RCC-trench method of storing the waste, according to IRE, had been finalised after four years' of consideration at the BARC in Trombay. It is also said to be the internationally-accepted standard, on which many monazite-processing countries have sought information from India. The BARC has also certified the method at the premises as "completely safe" under the Radiation Protection Rules, 1971, and radiation as much below the permissible levels, the affidavit said.

The casks of the required thickness prevent radioactive contamination and also contribute to the reduction of radiation levels at the outer surface of the casks.

NATURAL RADIATION

In his letter of May 29 this year, the head of the division of radiological protection, BARC, said a check on the various points on the adjoining public road had revealed an exposure comparable with natural radiation received from cosmic rays and radioactivity in the rocks and soil everywhere.

IRE processes monazite and produces chloride of rare earth metals, which is exported, besides tri-sodium phosphate, which is marketed indigenously. Thorium concentrates become the property of the government on production.

Established in 1950 as a limited company and jointly owned by the government of India and the erstwhile Cochin-Travancore government, it became a full-fledged Central undertaking later, with the handing over of shares to the government by the princely state. It now employs about 2,000 people at its factory and offices. Besides, 3,000 people work for contractors on seasonal operations such as sand collection.

CSO: 5100/7134

BRIEFS

ATOMIC ENERGY EMPLOYEES COUNCIL--Bombay, August 3--An all-India council of atomic energy employees has been formed with "the guidance of INTUC leaders," to oppose the "violent activities ot Naxalites and the CPM and also to fight for pay revision and bonus rights." The formation of the council follows two days of deliberations here by representatives from the various establishments of the department of atomic energy which ended yesterday. Representatives from the BARC, the Tarapur and Rajasthan atomic power stations, the Narora project, the heavy water plant at Baroda, and the uranium unit at Jaduguda were present at the discussions which were presided over by the INTUC leader, Mr Raja Kulkarni. Two other INTUC leaders, Mr Bhai Bhosale and Mr Vasant Hoshing, were also present, according to a council release here today. The meeting decided to face the "challenge of violence and misuse of trade-union power by the CPM and other leftist parties at Jaduguda, Talcher, and other places." In a memorandum to be submitted to the Prime Minister, Mrs Indira Gandhi, the council would call for the reconstitution of the joint consultative machinery for bipartite negotiations and the application of bonus, standing orders, and factories Acts to the Atomic Energy Commission, the release added. The meeting elected Mr Kulkarni and Miss Mary Emmanuel as president and general secretary of the council respectively. [Text] [Bombay THE TIMES OF INDIA in English 4 Aug 81 p 3]

RADIOACTIVE WASTE DISPOSAL--New Delhi, July 26. A waste immobilisation plant for incorporating the high-level radioactive wastes, generated from the fuel reprocessing plant at Tarapur, is in an advanced stage of construction. According to the Atomic Energy Commission sources, the plant, being constructed indigenously, is expected to be commissioned early next year. Meanwhile, work on the construction of the solid storage surveillance facility is being taken up shortly at Tarapur. The basic philosophy for management of radioactive wastes in the country has been to concentrate and contain as much radioactivity as possible, and discharge to the environment only effluents at "as low a concentration level as practicable", the sources said. Over 99 per cent of the total radioactivity in the nuclear fuel cycle is generated from the fuel reprocessing plant. To ensure that this highly radioactive waste stream does not pose any hazard to environment, a three-stage approach has been adopted. First, the waste will be incorporated in stable and inert solid matrices. The conditioned waste will then be placed in canisters and kept in a retrievable store under cooling and constant surveillance. Ultimately, the canisters will be stored in suitable geological media.--PTI. [Text] [Madras THE HINDU in English 27 Jul 81 p 16]

URANIUM PURCHASE FROM PRC SUPPORTED--Janata leader Subramaniam Swamy on Friday urged the Government to start negotiations with China to obtain enriched uranium instead of wasting time in negotiating with the US for the purpose. It could supply China radio isotopes which it was now importing, reports UNI. In a statement Dr Swamy wondered why the US officials had come here at all for negotiations. And how could India negotiate with a country which had proved itself completely unreliable on this matter? Dr Swamy expressed surprise at news reports that India was negotiating with the US on the control of the spent fuel from Tarapur atomic power systems. He recalled that in March last, External Affairs Minister P. V. Narasimha Rao had assured the Lok Sabha that no such negotiation would take place. If the news report was correct, it would be gross breach of parliamentary assurance. [Text] [New Delhi PATRIOT in English 1 Aug 81 p 5]

CSO: 5100/7136

EXPERT SAYS PAKISTAN BENT ON GOING NUCLEAR

Bombay THE TIMES OF INDIA in English 10 Aug 81 p 21

[Text] ISLAMABAD, August 9 (PTI): A Pakistani academician believes the incentives for Pakistan to go nuclear are in abundance, but feels operative technological constraints would compel Islamabad to forgo its bomb option—at least for quite some time.

In fact, the popular mood has been gradually shifting in favour of a nuclear programme, says Prof. Pervaiz Iqbal Cheema, project director of strategic studies, department of international relations, at the Quaid-i-Azam university here.

And no amount of pressure was likely to result in the abandonment of Pakistan's nuclear programme, he adds, in a working paper published by the strategic and defence studies centre of the Australian national university, Canberra.

The paper now available here opines that the western pressure to influence Pakistan to refrain from undertaking the forbidden course appeared to have strengthened the determination of the Pakistanis to go nuclear.

However, Prof. Cheema says assuming Pakistan acquires the necessary technological know-how and weapon grade uranium or plutonium, the decision to explode a bomb will not be easy.

COSTLY PROGRAMME

Not only would it provide a legitimate excuse for India to "weaponise" its peaceful nuclear programme, but it would entail a long and costly programme of acquiring or building a delivery system.

Given the existing state of the economy and industrial capacity, Pakistan can neither afford to buy the accompanying paraphernalia nor is it able to produce it on its own, he says.

Prof. Cheema says although it is still arguable whether or not Pakistan has decided to go for a bomb, one thing is certain that Pakistan will continue experimentations in the nuclear field.

President Gen. Zia's government, Prof. Cheema says has repeatedly denied any intention to go nuclear, but nobody, especially in the western media, seems to believe that although the evidence quoted is basically circumstantial.

Most workers and some governments seem to be convinced that Pakistan is secretly engaged in making an atomic bomb and is likely to explode it in the near future.

And to prevent such an eventuality some governments are tightening the screws on Pakistan, Prof. Cheema says.

Examining Pakistan's capability to manufacture the bomb, Prof. Cheema says it appears that Pakistan would have accumulated (from its two operational reactors) enough plutonium by the mid-1980s to produce a reasonable quantity of bombs.

However, without a chemical separation plant or reprocessing plant, it was impossible to even contemplate the making of a bomb and Pakistan does not have this facility so far despite its 1976 deal with France.

ENRICHED URANIUM

Referring to speculation that Pakistan had now decided to adopt the enriched uranium route to the bomb, Prof. Cheema says, that no plant to manufacture enriched uranium had been built in Pakistan so far.

And no plant would be built unless the uranium enrichment process has been tested at the laboratory level and even that would require the involvement of several domestic industries. "Does Pakistan have the essential industrial infrastructure," he asks.

What seems reasonable to assume, Prof. Cheema says, is that Pakistan might have extended its research facilities in the field of nuclear technology somewhere near the capital and some scientists might have been conducting research with regard to uranium enrichment methods as well.

The building of a plant would follow provided the tests in the laboratory are successful. The actual explosion will be perhaps be the third stage, he says.

Prof. Cheema says while Pakistan is probably still struggling at the first stage, many journalists had not only mentioned the probable sites for explosion, but had even made some "ludicrous suggestions" regarding destruction of nuclear research laboratories in Pakistan.

FIRST STAGE CROSSED

Assuming that Pakistan had crossed the first stage and was now involved in the building of uranium enrichment plant, it should be an insult to Pakistani intelligence to take for granted that it would locate the key facilities so close to the capital and in so militarily unguarded an area, he says.

Prof. Cheema says if Pakistan goes nuclear, it was almost certain that India would exercise it option to acquire nuclear weapon justifying such pursuit on the basis of security considerations.

It would also not be surprising if India, eventually, was motivated by the belief that nuclear weapons might produce a stable deterrent relationship with China on the one hand and strengthen India's bargaining position on the other, he says.

As far as the domestic pressures and compulsions were concerned, the incumbent economic, political and social problems had already acquired a dangerouos proportion, he says.

CSO: 5100/7143

LAW ON COLLECTION, STORAGE OF RADIOACTIVE WASTE PUBLISHED

West German Commentary

Bonn IWE-TAGESDIENST in German No 89, 18 Jun 81 p 1

[Report from Berlin: "GDR Establishes Central Repository for Radioactive Wastes." A translation of the East Berlin GESETZBLATT law cited below follows this commentary.]

[Text] A new order by the East Berlin Office of Atomic Safety and Radiation Protection takes effect on 1 July concerning the central recording and storage of radioactive waste. The final disposal area is Morsleben in Bezirk Magdeburg (near Marienborn); the deposit as such is an underground salt dome. The order obligates all enterprises and institutions, which generate radioactive waste, to collect it, process it, provide intermediate storage, and finally to deliver it to the central terminal disposal area. Complete documentation must be maintained as to the type and quantity of developing atomic waste. For "compelling technical and economic reasons" special regulations with specific time limits may be issued by the central recording and final storage authority. Interim regulations apply furthermore until the final disposal facility is fully operational (GESETZBLATT, I, 16/81).

Text of Law

East Berlin GESETZBLATT DER DEUTSCHEN DEMOKRATISCHEN REPUBLIC in German Part I No 16, 10 Jun 81 pp 224-226

[Official text of "Order on Central Collection and Final Storage of Radioactive Wastes, dated 11 May 1981," signed by Prof Sitzlack, MD, state secretary, president, State Office for Nuclear Safety and Radiation Protection]

[Text] On the basis of Articles 16 and 29 of the 26 November 1969 Radiation Protection Decree (GBL, II, No 99, p 627), the following is hereby ordered for the sake of the safe recording and final deposit, in a manner effective for the national economy, regarding radioactive waste in agreement with the directors of the competent central government agencies and in agreement with the Federation Executive of the Free German Labor Union Federation:

Article 1. Area of Applicability

(1) This order applies to the following:

Government agencies and economy-managing agencies,

Combines, combine enterprises, enterprises and installations (hereafter referred to as enterprises),

which operate nuclear plants, which handle radioactive materials or which operate radiation installations containing enclosed radiation sources.

(2) This order applies to solid and liquid radioactive waste where decay in 200 days, below the boundary values determined by law[1], is not possible.

(3) This order does not apply to the storage of materials and waste materials containing natural radionuclides on dumps and disposal areas[2].

Article 2. Basic Principles

(1) Radioactive waste according to Article 1, paragraph 2, must be recorded and final-stored in a central manner.

(2) The purpose of central recording is the transfer of radioactive waste by the government agencies, economy-managing agencies, and enterprises, where waste develops, in combination with the acceptance of this waste by the enterprise which is charged with central recording and final storage of radioactive waste[3].

(3) The purpose of central final storage is the placement of radioactive waste, to be centrally recorded, in a place for permanent storage under conditions which are suitable for the isolation of radionuclides from the environment until the current values have fallen below the specified boundary values.

(4) In planning, preparing, and executing investments and processes for the operation of nuclear plants or radiation installations, which contain enclosed radiation sources, and in handling radioactive materials, the government agencies, economy-managing agencies, and enterprises must take into consideration the measures required for the collection, processing, intermediate storage, and delivery of radioactive waste to be centrally recorded.

(5) Radioactive substances or radioactively contaminated substances and objects may be turned over as radioactive waste for central pick up and final storage only if there is no further possibility of using these substances or objects or components, if they do not contain any usable secondary raw materials, or if recovery of secondary raw materials can be accomplished only with a heavy expenditure that would not be justifiable in the interest of the national economy.

(6) The yield of radioactive waste must be kept as small as possible. Radioactive waste must be converted into a form permitted for central recording and pick-up through processing[4].

(7) Radioactive waste, subject to central pick up and final storage, must be collected separately from all other waste and must be placed in intermediate storage in the control sector until transfer for central pick-up.

Article 3. Responsibility

(1) The government agencies, economy-managing agencies, and enterprises, where radioactive waste develops, are responsible for the collection, processing, intermediate storage, and transfer of radioactive waste for central pick-up.

(2) The enterprise which handles the final storage of radioactive waste is responsible for accepting radioactive waste for final storage.

(3) Government agencies, economy-managing agencies, and enterprises must carry out those control and safety measures for the collection, processing, intermediate storage, central pick up, and final storage of radioactive waste which will make sure that unauthorized access will be impossible.

Article 4. Documentation

(1) Government agencies, economy-managing agencies, and enterprises, in which radioactive waste develops, must maintain complete documentary evidence on the collection, processing, intermediate storage, as well as transfer of radioactive waste for central recording and pick up. They must guarantee enterprise control over the yield and where abouts of radioactive waste.

(2) The enterprise which handles central pick up and final storage of radioactive waste must maintain complete documentary evidence on the quantity, type, and origin of radioactive waste in final storage. It must assure enterprise control over radioactive waste which is accepted and placed in final storage.

Article 5. Radiation Protection License

(1) Along with the petition for the issue of a radiation protection license, it is necessary, in addition to the previously required documents[5], to submit the following data and evidence for radioactive waste to be handled for central pick-up:

1. Data on the anticipated yield of radioactive waste (quantity, activity concentration, radionuclide composition, chemical and physical properties);

2. Description of installations and plants for collection, processing, intermediate storage, and transfer of radioactive waste;

3. Data on documentary evidence kept regarding radioactive waste as well as on enterprise control and safety measures in accordance with the provisions of Article 3, paragraph 3, and Article 4;

4. Evidence to the effect that radioactive or radioactively contaminated substances and objects or components thereof, which are to be handed over as radioactive waste, cannot be further utilized, do not contain any further useful secondary raw materials, or that recovery of secondary raw materials can be accomplished only with a heavy expenditure that cannot be justified in terms of the national economy;

5. Evidence to the effect that radioactive waste meets the requirements, in terms of shape and properties, as well as the transfer and acceptance conditions;

6. Evidence as to contractual agreements with the enterprise responsible for central recording, pick-up, and final storage.

(2) In case of any intended changes, especially in case of a change in the yield, the type, and the properties of radioactive waste, government agencies, economy-managing agencies, and enterprises must request an amendment in the radiation protection license from the State Office of Atomic Safety and Radiation Protection.

Article 6. Performance Conditions

(1) The requirements regarding form and properties as well as the transfer and acceptance conditions for radioactive waste to be picked up in a central manner are guided by the order to be issued by the minister of coal and energy in agreement with the president of the State Office of Atomic Safety and Radiation Protection.

(2) The central recording, pick-up, and final storage of radioactive substances is connected with mandatory costs. The costs are to be borne by the government agencies, economy-managing agencies, and enterprises in which this radioactive waste develops. The costs are calculated on the basis of the particular applicable price chart.

Article 7. Exceptions

(1) If, for compelling technical or economic reasons, determinations in this order cannot be complied with in individual cases, then a special regulation, with a specific deadline, is to be requested in writing, regarding the intended deviations, from the president of the State Office of Atomic Safety and Radiation Protection by the directors of the government agencies, economy-managing agencies, or enterprises. The petition must contain the following data:

1. Detailed data on deviations from the determinations in this order, along with justifications;

2. Data and justification for duration of validity of special regulation;

3. Data as to how radiation protection and safety in the collection, processing, intermediate storage, and transfer of radioactive waste for central pick-up can be guaranteed through other measures and means.

(2) To the extent that these special regulations touch the task sphere of other central government agencies, they must be made in agreement with the directors of the participating central government agencies.

Article 8. Transition Regulations

(1) Until complete acceptance of the pick up function by the enterprise, which is to handle central recording, pick up, and final storage, the State Office of Atomic Safety and Radiation Protection will also record those radioactive waste items which do not meet the requirements, in terms of shape and properties, as well as the transfer and acceptance conditions for radioactive waste to be centrally recorded. Details on this will be determined by the particular radiation protection permit.

(2) Government agencies, economy-managing agencies, and enterprises, which have a radiation protection license or which have submitted an application for the issue of a radiation protection license, are obligated, directly, but at the latest up to 2 years after the entry into force of this order, to submit data and documentary evidence, in accordance with Article 5, paragraph 1, for the supplementation of radiation protection permits to the State Office of Atomic Safety and Radiation Protection.

Article 9. Final Provisions

(1) This order takes effect on 1 July 1981.

(2) The following are at the same time rescinded:

Article 23 of the First Implementing Regulation of 26 November 1969 for the Radiation Protection Decree (GBL, II, No 99, p 635),

The Guideline for the Central Recording of Radioactive Waste of 28 March 1974 (Communication of the State Office of Atomic Safety and Radiation Protection, 1975, No 5).

FOOTNOTES

1. At this time, Article 22, paragraph 3, of the First Implementing Regulation of 26 November 1969 to the Radiation Protection Decree is applicable (GBL, II, No 99, p 635).

2. Currently, the Order of 17 November 1980 on guaranteeing radiation protection in dumps and industrial waste disposal areas and in the use of materials deposited there is applicable (BGL, I, No 34, p 347).

3. VE Combine Nuclear Power Plants "Bruno Leuschner," final storage operation for radioactive waste, 3241 Morsleben.

4. Currently, the definition according to TGL [GDR norms] 25296/02 is applicable: "Treatment of radioactive waste for concentration of radionuclides in a form favorable for waste deposit and recovery of inactive carrier substance, that is to say, all process steps which are connected with the processing of radioactive waste, such as reduction of its volume, consolidation for the purpose of fixation of radionuclides prior to processing and final storage."

5. Currently, the First Implementing Regulation of 26 November 1969 to the Radiation Protection Decree is applicable (GBL, II, No 99, p 635) along with the Appendix to the 21 June 1979 Nuclear Plant Licensing Order (GBL, I, No 21, p 198).

5058
CSO: 2302/8

BRIEFS

NUCLEAR PLANT AT ASSEMBLY STAGE--All important components of the first reactor of the Paks Nuclear Power Plant have arrived from Czechoslovakia. Assembling and fitting of the internal reactor equipment is now underway. The 30-ton lower section of the reactor shaft has been put into place. This will be followed by assembly of the 107-ton upper block. The drive of the rods controlling the intervention mechanism will also be located in this nearly 12-meter-long block. All persons working in the reactor container wear special buttonless suits so that no fragments of any sort will remain in the mechanism and cause problems later. Workers' tools are counted when workers enter and leave the work site. The finished reactor will weigh over half a million kilograms. Once this phase of installation is completed, the primary circuit will be pressure tested, and then the entire system will be washed. [Budapest MAGYAR HIRLAP in Hungarian 16 Aug 81 p 4]

CSO: 5100

CASTRO MADERO ASSERTS NUCLEAR LEADERSHIP

Buenos Aires MERCADO in Spanish 30 Jul 81 pp 2-26

[Interview with Vice Admiral Carlos Castro Madero, the chairman of the National Atomic Energy Commission]

[Text] The Argentine nuclear plan, little by little, is achieving all its objectives. Neither the nation's financial problems, nor the pressures brought to bear by nations which possess the most advanced technology have been able to stop Argentina's development in this field. Because of this, Argentina is exercising a true leadership role in Latin America. It is the only nation in the region which has a nuclear power plant operating: Atucha I has been in operation since 1974. Its second plant, Embalse Rio Tercero, will open next year, and the construction of the third plant, Atucha II, has just begun. At the same time plants producing nuclear materials are being built. These include the heavy water plant in Arroyito, Neuquen Province, and Argentina is now on the way to achieving total control of the fuel cycle. Just last week the first batch of 200 fuel elements was completed in the pilot plant of the Constituyentes Atomic Center, and industrial-scale production will start in 1982. Furthermore, a number of agreements have been reached with other nations. One of these is a contract with Peru, to which Argentina is exporting nuclear technology. This is the first operation of this type among developing nations. There can be no doubt: nuclear development in Argentina is moving ahead. Vice Adm Carlos Castro Madero, the chairman of the CNEA [National Atomic Energy Commission], discussed these issues during an exclusive interview with MERCADO.

Question: Argentina's development in the nuclear field now places it in a favored position in Latin America. How would you define this "nuclear Argentina"?

Answer: Almost since the time of the establishment of the Atomic Energy Commission, Argentina has developed a very coherent policy which looks toward the future, considering the need for this new energy source that the nation would have. That is why "nuclear Argentina" is in a stage of development which clearly differentiates it from the rest of Latin America. Argentina's nuclear capability has some very salient features since it has had a nuclear power plant in operation since 1974; this makes the nation outstanding not only in the Latin American orbit, but also in the world, particularly among the developing nations. There are very few developing nations which have nuclear power plants, and there are a great many countries which may be considered developing nations. The Argentine nuclear program is one of the few nuclear plans that are now moving ahead in the world. And in this case I am referring to effective nuclear plans, those which are moving forward at a suitable and scheduled rate of progress. The most important nuclear plans now are those in France, Russia, and in the Argentine republic.

Question: And why are there so few?

Answer: Because there is in the world a movement against the development of nuclear energy. This movement is supported by two ideas: to avoid environmental pollution, since this is an energy source that some people think may affect the population's safety; and to avoid nuclear proliferation. This has practically paralyzed commercial exchanges in this field. These two ideas have halted the most important nuclear programs, and of those nations which have managed to get around this opposition, there are very few which have nuclear programs in full development. I want to make it very clear here that I am not comparing the magnitude of these programs, but these are plans that are being executed as scheduled, which the governments fund as needed, and which have met no resistance from public opinion against their development.

Question: How can the development of the nuclear plan be maintained with Argentina's budget problems and in the face of the pressures on Argentina from other nations, such as the United States?

Answer: Our national government is aware of the importance of nuclear energy for Argentina's future development; it is aware of the advanced position that the nation has achieved through its 30 years of work in this field, and quite logically, it doesn't want these efforts to be wasted. Therefore, within these limitations which you have mentioned, and while it is true that the nuclear plan will have to make some adjustments to optimize the use of resources and to give maximum participation to the private sector, the Commission will still receive adequate funding.

Question: And what about the external pressures?

Answer: Argentina has a very firm and definite position. Our policy has always been very clear, very frank, and very open, so that the pressures that are still being exerted to keep us from acquiring control in this field have been inadequate and not truly rational. Most recently, the latest attempt was to try to include a clause in the safeguard agreement that Argentina was to sign with the support of the IAEA [International Atomic Energy Agency], based on a commitment by the Federal Republic of Germany, about the Atucha II safeguards, which we rejected. I made a presentation pointing out the arbitrary nature of that clause, and showing our disagreement with it. Because of that demand, the agreement could not be approved by the date when Argentina needed it, in June, in order not to impede the flow of technology from Germany. Because of that the organization held a special meeting to discuss the issue approximately 20 days later, when the agreement was approved by general consent. We suppose there will be another such attempt made for the heavy water plant, but Argentina will act with the same firmness and certainty, and we hope to overcome these problems.

Question: Concerning the United States, the situation doesn't seem to have changed too much since President Reagan's election.

Answer: I think the U.S. nuclear policy has changed, but in its broad outlines. Not its relation to Argentina. That is what we find as far as the letter of the law is concerned, because as the policy stands, no exchange of technology between the two countries will be possible. The United States policy requires that countries which may receive U.S. technology must be signatories of the Nuclear Non-Proliferation Treaty, or subject all their nuclear facilities to safeguards. And as Argentina does not accept either of these alternatives, if we follow what the U.S. legislation says, it would appear very difficult for us to have any cooperative exchange with the United States. Unless they are more flexible in the implementation of this policy; I think that in this respect, the current administration may be more favorably disposed to Argentina.

Question: So the possibilities of reaching an agreement have to come from the United States, and not from Argentina?

Answer: That is correct. Argentina has already defined its objective, which is to achieve self-sufficiency in the nuclear field, and it is unwilling to have any limitation on its development of the fuel cycle. Furthermore, the country has also clearly defined its policy on safeguards; it is not prepared to sign a blank check, which is what signing total safeguard agreements would amount to. Argentina believes there has to be an equilibrium, a balance, between the guarantees that the nation gives and the reception of the technology it needs for its development. We should not forget that the countries which placed their trust in and signed the non-proliferation treaty, which wrote a blank check, in exchange for the promise that they would get all the technology needed for their nuclear development for peaceful purposes, have been completely defrauded.

Question: What countries were defrauded?

Answer: All the ones which signed the treaty; there are 111 of them. That was apparent during the conference to revise the treaty, because those countries showed their disagreement. They have kept their promise not to engage in military developments, while the developed countries have not kept their commitment to provide technology, and there are also some reservations about whether they did their best to achieve nuclear disarmament. This means that the more developed nations have kept none of the commitments that they made in the treaty. Argentina has no intention of developing its nuclear technology for military purposes, but it is willing to provide safeguard guarantees in exchange for the provision of assistance through equipment, technology, etc.

Question: What impression has been made, and what comments have you heard from abroad about Argentina's nuclear plan?

Answer: When you asked me how I would define "nuclear Argentina," I told you that ours is one of the few active programs in the world. THis has been recognized in speeches by the director general of the IAEA, who has spoken of Argentina's nuclear development. This is why, in the nuclear field, our country's opinion is listened to with great respect, because Argentina has behind it an effort, an infrastructure, which back up its opinion. Argentina has had some success in its dealings with more advanced nations, which we should mention. The fact that we finally managed to obtain supplies for the industrial heavy water plant and for the Atucha II power plant without having to sign total safeguards is an example showing that Argentina deals with the more advanced countries as an equal. And in relation to the developing nations, Argentine delegations to international conferences have found a great deal of interest in making contacts and establishing cooperation. We have established bilateral agreements with the nations of Latin America, of which the most important is what we are doing with Peru: the transfer of technology for the first time between developing nations. But we have also established contacts with very distant countries, such as South

Korea, Pakistan, Turkey, and Egypt, as well as some others. In some instances agreements have already been signed, and in others there have been talks and visits which show an interest in our program.

Question: Looking at it from the other side, because the doors of the United States have been closed to us, Argentina is now seeking technology from other countries.

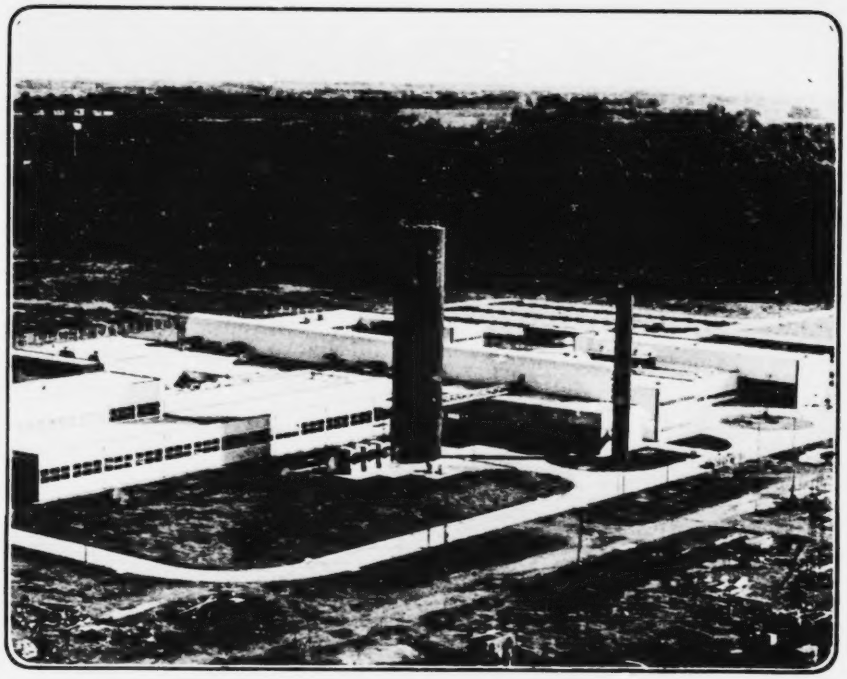
Answer: Right. We have looked for more advanced countries that will accept Argentina's policy in this field. Actually, the advance of the Argentine nuclear plan, despite the opposition of the larger countries, is what has given Argentina great prestige throughout the world.

Question: What about Argentina's relations with the Soviet Union?

Answer: We have purchased supplies from the Soviet Union: for example, 5 tons of heavy water to replace normal operating losses at Atucha I, and we have well advanced negotiations in progress for the purchase of enriched uranium for our irradiation reactors, which we could not get from the United States because of our differences with that country. Furthermore, there is a possibility of our buying more heavy water from the Soviet Union; we would use this to build up our supplies in case there is some delay in the start of operations of our industrial plant. Also, we have in the past purchased another type of equipment, some rolling presses that were installed in the zircaloy tube factory.

Question: At the beginning of this interview, you mentioned that unfavorable public opinion had paralyzed nuclear development in a number of countries. To what do you attribute the fact that a similar phenomenon has not occurred in Argentina? On the contrary, in Argentina there is a positive attitude on the part of public opinion.

Answer: I think that the nuclear plan is a national objective which has come to be shared by all Argentines, who see with satisfaction how our country is making progress in this field. That is why public opinion here is fully in favor of the nuclear plan. In the second place, I think that an action taken by the CNEA has helped; it decided to spread out its work and to concentrate very specially on the safety of its nuclear facilities, so that there will be no problem or failure in its operations. In the third place, we have to point out that Argentina has the great advantage of having vast open spaces, so its atomic facilities can be located far from major population centers.



The fuel elements plant. Industrial-scale production will begin in 1982.

Question: Could you explain to us, in more detail, how the agreement with Peru is being fulfilled?

Answer: We have a contract to supply Peru with an atomic center, whose construction is to be done jointly, that is, with a high participation of Peruvian personnel, with the maximum participation possible of Peruvian industry; this also includes a training program for human resources so that they can take over the center from its start. This contract, as I told you, had a profound international impact because it was never thought possible that a developing nation like Argentina would be able to handle this type of transfer of technology. This was one of the reasons that lifted Argentina to a higher plane. This contract is also being watched with much attention by the rest of Latin America, and fortunately, it is being carried out in a completely normal manner. The design and basic engineering have already been completed, and now the civil engineering work is in progress. Its completion is scheduled for approximately July or August 1983.

Question: What possibilities are there for Argentina to continue working with Peru once this project is completed?

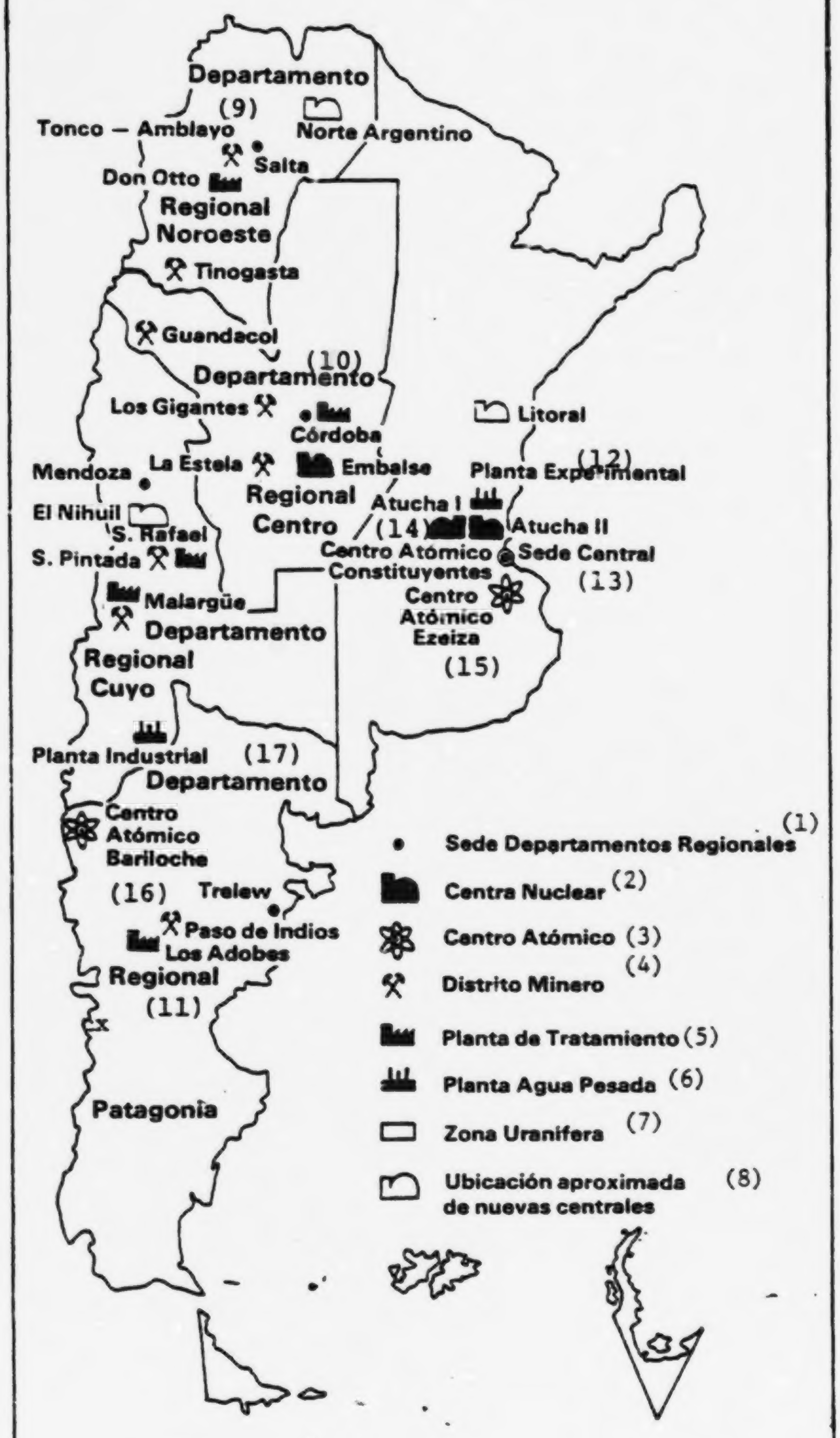
Answer: Peru's nuclear officials have expressed an interest in expanding this atomic center, which has an irradiation reactor, to produce radioisotopes; laboratories to produce radioisotopes; physics and chemistry laboratories using the reactor with a neutron source for experiments; nuclear protection and safety laboratories; a building for guest housing and administrative purposes; workshops; a fire protection service, etc. There are possibilities of expansion with a uranium concentration plant and with a fuel element plant. These expansions can be done if there are sufficient resources available; that will depend on Peru and on its financial and economic situation. But there are some general lines that will make it possible to keep on with this Argentine-Peruvian cooperation.

Question: What about the agreements with Brazil?

Answer: We have two types of agreements with Brazil. One is with the Brazilian National Atomic Energy Commission, which has a more limited jurisdiction than Argentina's commission, because it works only on research and development and the licensing of nuclear facilities. We have two agreements with them: one for the exchange of technical information, and the other for the use of centers for training human resources. This is a reciprocal offer. The other agreements were made with the firm NUCLEBRAS [Brazilian Nuclear Corporations] which is responsible for the fuel cycle and for engineering for nuclear power plants. We have signed three contracts with NUCLEBRAS. One is for the loan of 240 tons of uranium (in 2 years, at the rate of 120 tons a year), which Brazil will return when it begins exploitation of its mines at Pozo das Caldas, and which it will repay with an interest in uranium of 6 percent a year. According to the terms of the second contract, Argentina will deliver to Brazil up to 160,000 meters of zircaloy tubes, coming from the factory that we are now completing in Ezeiza. The importance of this operation lies not only in the economic value of the sale of 160,000 meters of tubes, but also in the favorable conditions, if our product passes the qualification tests, for providing the rest of the tubes for the Brazilian nuclear plan. In that way the scale factor of our zircaloy tube factory will significantly improve and this will also enable us to qualify internationally as suppliers of these products. Then we would obtain a "license" to take part in any international bidding in any country. The third agreement was to authorize the German firm, KWU, to have the work for the lower part of the pressure containers for our Atucha II plant to be done by NUCLEBRAS. These parts, which are made in Japan, will be sent to Brazil to be finished, and will then be shipped to Buenos Aires to be installed in the container.

The Resources of "Nuclear Argentina"

Los recursos de la Argentina nuclear


Departamento
(9)
Tonco — Amblayo
Norte Argentino
Salta
Don Otto
Regional
Noroeste
Tinogasta
Guandacol
(10)
Departamento
Los Gigantes
Córdoba
Litoral
Mendoza
La Estela
Embalse
Planta Experimental
(12)
Regional
Centro
Atucha I
El Nihuil
S. Rafael
(14)
Atucha II
S. Pintada
Centro Atómico
Constituyentes
Sede Central
(13)
Centro
Atómico
Ezeiza
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Departamento
Regional
Cuyo
(15)
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Bariloche
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● Sede Departamentos Regionales (1)
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Key for preceding page:

1. Headquarters of regional departments
2. Nuclear power plant
3. Atomic center
4. Mining district
5. Treatment plant
6. Heavy water plant
7. Uranium-producing area
8. Approximate location of new power plants
9. Northeastern regional department
10. Central regional department
11. Patagonia regional department
12. Experimental plant
13. Central headquarters
14. Constituyentes Atomic Center
15. Ezeiza Atomic Center
16. Bariloche Atomic Center
17. Industrial plant

Question: Is there any other agreement you should mention?

Answer: Another important agreement with the Latin American nations is the joint feasibility study of an atomic center to be built in Uruguay. This project will make clear the real need for such a center, and at that time, Uruguay will issue an invitation for bids, in which Argentina will participate. The center would be similar to the one being built in Peru.

Question: Isn't there also a project with Brazil for the joint production of enriched uranium?

Answer: No. Brazil has its program associated with the Federal Republic of Germany, in which Argentina is not a participant. There are no such plans. I want to emphasize this because the report originated in Brazil that I had said that we were going to develop a joint plant in Espiritu Santo. I never said that. We have to remember that after many years of no cooperation, Brazil and Argentina are now taking the first steps in a very balanced relationship. Neither of the two nations will benefit more than the other; both will benefit to an equal degree.

Question: Does the fact that Argentina and Brazil have chosen different technologies for their nuclear programs impede mutual cooperation?

Answer: No, not at all. A nuclear power plant has so many components that the fuel part barely takes away a small amount of the possibilities for cooperation. There is no doubt that the cooperation would have been closer if we had chosen the same technology, but that does not prevent us from a broad spectrum of cooperation, in which the type of reactor plays no role.

Question: From what you are saying, it seems that the possibilities for working with Brazil have not yet been exhausted.

Answer: There is room to keep on working, and I think that this future cooperation will be based on the advantages and benefits that are obtained from these first steps that we have taken.

Question: Some days ago a news item was published saying that Brazil was carrying out a secret plan to produce atomic weapons. How does that affect relations between our two countries?

Answer: I think that report is false. Brazil has a nuclear program with very close ties to the Federal Republic of Germany, and it is totally covered by safeguards. In my opinion, it would be impossible for Brazil to conduct a military program. And that is independent of the repeated assurances by Brazil that it is only pursuing the use of nuclear energy for peaceful purposes.

Human Resources

The availability of human resources is another of the factors that the CNEA has made plans for. This is where the Balseiro Institute of Bariloche plays a key role. Until 1977 this institute only produced very high-level physicists. But in that year the field of nuclear engineering was established, which rapidly produced results, with the recent graduation of the first 16 nuclear engineers, who have already received 46 job offers.

In addition, through an agreement with the University of Buenos Aires, this year a postgraduate competition in nuclear engineering is being held. From the participants, with a variety of backgrounds, a group will be selected to go to foreign universities in order to obtain their doctoral degrees. All these people, according to the CNEA, will be the creators of our technology of the future.

On the issue of cooperation and the maintenance of power plants, training courses for professionals and technicians are given at Atucha. Then these people will work on the construction of Embalse and Atucha II.

The Search for Independence

The nuclear plan being carried out by the CNEA will change Argentina into a nation independent of the more advanced countries in this field. The program, as we know, calls for the installation of four 600-MW nuclear power plants that will use natural uranium and heavy water as a moderator. These plants are in addition to the Atucha I plant, which has been operating since 1974, and the Embalse Rio Tercero plant, now being built, which is to start operating next year. In this way, the nation will have six nuclear power plants operating at the end of the century. Additionally, the plan also covers the construction of related facilities, such as a heavy water plant, and other factories related to the fuel cycle.

The first of this series of four plants is the Atucha II plant, whose construction began on 15 July 1981. Work has also begaun at Arroyito, Neuquen province, on the civil engineering for the industrial-scale heavy water plant, whose engineering is being done in Switzerland. For the fuel cycle, Argentina already has a plant that will produce fuel elements on an industrial scale in Ezeiza. Just last week the CNEA celebrated the completion of the first batch of 200 fuel elements which came from its pilot plant at the Constituyentes Atomic Center. "This is a highly significant achievement," said Vice Adm Carlos Castro Madero, "which enables us to cancel our option to purchase a new batch of fuel elements from Germany, as we have been doing until now." These elements were produced in Germany with uranium that was sent from Argentina. Their cost was $75,000 each; as each core has 253 fuel elements, the cost of each cluster came to $22.5 million.

That pilot plant will now be moved to Ezeiza, where next year the industrial-scale fuel element plant will begin to operate. In principle, this plant is to supply the Atucha I plant, but production lines are already being prepared to meet the demand for Embalse and Atucha II.

This entire process is being done using imported uranium dioxide. Toward mid-1982 this product will begin to be manufactured in Cordoba province. At the same time, the fuel elements are being made with zircaloy tubes, whose raw material is imported. But the CNEA has already built a factory to manufacture these tubes. In addition to supplying tubes for the Argentine nuclear program, the factory will also handle Brazil's needs. This plant will start production on an industrial scale in 1983. At that point Argentina will have achieved total control of the entire fuel cycle. All this means that by 1987, when the ATucha II power plant begins to operate, its fuel elements and heavy water will be completely made in Argentina.

The Embalse power plant: operations will begin in 1982.

For the construction of power plants, the ENACE [Argentine Nuclear Power Plants Enterprise] has been established. This is a joint corporation, whose capital is held 75 percent by the CNEA and 25 percent by the KWU [Kraftwerk Union AG] of Germany, which is the supplier of nuclear and conventional equipment for Atucha II. ENACE is responsible for managing the entire Atucha II project; this means that the old type of "key in hand" contract used for Atucha I and Embalse has been abandoned. "Through ENACE," explains Castro Madero, "Argentina is going to learn the design and construction of power plants; until now we have left this technology in the hands of contractors."

As the four power plants scheduled in the plan are being built, KWU's participation in the ENACE will gradually decrease, giving way to private engineering firms. In that way the plan will reach the last plant, which is probably to be located along the Buenos Aires coast. In this plant Argentina's participation will be 100 percent for engineering, 90 percent for assembly, 100 percent for civil engineering, and 60 percent for the supply of electromechanical parts. The only elements that will be left to be imported will be 40 percent of the electromechanical parts. These parts are not restricted because they are of a conventional type and are readily available in the international market.

Nor will Argentina be dependent on foreign sources for its uranium supply which will be needed for its present and future power plants. Argentina's precisely known reserves now total 30,000 tons. This is enough to supply nine 600-MW plants during their 30 years of usable life. But the potential supply is even greater, and there is a 60 percent geological probability that there may be up to 250,000 tons of uranium reserves. If we include uranium which is expensive to exploit, the reserves would come to 400,000 or 450,000 tons. This figure, of course, not only guarantees the fuel supply for Argentina's plants, but it could make Argentina a major exporter of a highly valued product.

7679
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INTER-ARAB NUCLEAR POWER PROJECTIONS DISCUSSED AT DAMASCUS MEETING

Paris AL-MUSTAQBAL in Arabic No 227 27 Jun 81 pp 52-53

[Article: "Arab World Begins Generating Electricity From Nuclear Power Plants; Saudi Arabia Assigns Italian Firm, Libyan Jamahiriyah Concludes Contract With Soviets, UAE Conducts Study With International Agency and Syria Plans for 1990's"]

[Text] Reports on the nuclear sector in the Arab world have not been confined in the past few days to news of the Israeli enemy's raid against the Iraqi nuclear reactor but have gone beyond to a number of news reports and information reflecting current and future activities in the nuclear filed by more than one Arab country, especially in the generating electricity from plants operated by nuclear power.

In Saudi Arabia, it has been announced that a contract has been concluded to set up a nuclear power plant near the western coast. The value of the contract amounts to $95 million and has been won by an Italian consortium.

The Libyan Arab Jamahiriyah seems to have reached agreement with the Soviet Union to build a nuclear power plant to generate electricity at a capacity of 800 megawatts in addition to thermal plants and an electricity distribution network. This agreement has been reached, according to the British FINANCIAL TIMES, as part of a protocol recently signed by the two sides in Moscow to expand economic cooperation between the two countries, especially cooperation in building electricity generating projects in the Jamahiriyah.

Despite the special relative importance of this information, what is more important or prominent, has been the news of the convocation of the first Arab nuclear energy conference in Damascus from 15-19 June 1981. If the basic importance of this conference, the first of its kind in the Arab countries, is in its convocation and in the vast participation it attracted--40 delegations representing 40 Arab and foreign countries and governmental or scientific organizations--then the other aspect of its importance, even if it is of symbolic or superficial importance, lies in the fact that its convocation came on the morrow of the Israeli raid on the Iraqi nuclear reactor and that it was held in Damascus in particular, in an atmosphere of Israeli threats against Syria even though it has no nuclear reactors or anything of that nature.

On a purely scientific level, the conference has gained a certain importance through the participation of international figures in the nuclear field from the East, the

West and the Third World and through resulting discussions presented to it--discussions that covered all aspects of producing nuclear energy for peaceful purposes, of the uses, distribution and economics of this energy and of the means to protect man and the environment from the dangers of nuclear pollution.

For the Arabs, the conference was an occasion to announce new future nuclear energy projects in the Arab world, as it was an occasion to present objective (plans), projections and proposals concerning the electric power situation generally in some Arab countries and concerning formulas for developing Arab cooperation in this vital sector.

Future Arab projects to generate electricity from nuclear plants include two projects announced during the course of the conference.

The first was announced by UAE Minister of Water and Electricity Humayd Nasir al-'Uways, who pointed out that his country "has begun the studies necessary to set up a nuclear center for the use of nuclear energy in generating electricity" and that "an expert from the IAEA [International Atomic Energy Agency] arrived in Abu Dhabi 4 months ago to study the issue of building the center, which is expected to be completed at the beginning of 1990."

The second project was announced by Syrian Minister of Electricity Dr Ahmad 'Umar Yusuf, who revealed Syria why Syria is thinking of building projects to generate electricity from nuclear plants and why it is necessary to conduct a study of the issue now so as to enable construction of the desired plants in the 1986-91 period.

The Syrian minister put the preceding idea within the context of previous development of the Syrian power sector, within the spheres and potential of the development of Syria's electricity needs in the immediate and medium-range future and within the framework of studying the costs and operation of nuclear and thermal power plants.

Syria, which started the use of electricity in 1903, is one of the most deep-rooted Arab countries in this field, and the phases that "Syrian electricity" covered from the start of its production and distribution by private foreign and national firms to the establishment of a special Ministry of Electricity that owns and manages the entire electricity sector (1974)--through the phases of nationalization (1951), linkage of the domestic networks among the major cities (1965) and planning for needs up to 1985--show a big increase in electricity consumption averaging 21 percent annually in the 1974-80 period. This increase has required Syria to produce nearly 4.3 billion kilowatt-hours in 1981 and to have a peak production capacity of 850 megawatts. If the constant social growth in Syria, which has accompanied the general economic growth and the rise in the use of electrical household appliances and agricultural and industrial machinery, presumes an increase in the annual electricity consumption rate equal or close to the 1974-80 rate (i.e., 21 percent), then the energy required to be produced in Syria in 1991 will be around 28 billion kilowatt-hours.

The production of this volume of electricity from thermal plants, according to the minister's report, faces two obstacles: First, the thermal plants operate on the [word indistinct] fuel oil. Syria's oil production will equal its oil consumption in 1985. The second obstacle is economic, considering that the cost of a kilowatt-hour currently produced by a nuclear plant is only 60 percent of the same kilowatt produced by a thermal plant.

But in view of the fact that the construction of any nuclear power plant, after completion of the studies for such a plant, requires a period of no less than 10 years, as Dr Ahmad 'Umar Yusuf says, Syria has to somehow supply its electricity needs between 1986 and 1991 through the construction of nuclear and thermal plants that have been planned as follows:

Four thermal groups [plants] with a capacity of 150 megawatts.

Six thermal groups with a capacity of 300 megawatts.

Eleven nuclear groups with a capacity of 60 megawatts.

This means that more than 3,000 megawatts, needed to supply 18 billion kilowatt-hours, are to be added to whatever can be produced by all the capabilities available from the thermal and hydro plants already built and operating.

From the Arab standpoint, the conference was not, naturally, confined to the presentation of these private ideas and projects that concern certain countries; private needs. Rather, it was an occasion to present ideas on coordination among the Arab countries in the electricity and nuclear fields.

The address of Minister Al-'Uways about the UAE included a call for speeding up the use of nuclear energy in all aspects of Arab life. The address also pointed out that such accelaration requires coordination among all the Arab countries in the sphere of nuclear energy and its peaceful and effective applications.

The UAE minister focused on two points that are not at all difficult to implement:

First, preparing and training Arab cadres under a comprehensive formula so that they can transfer and develop nuclear technology according to requirements.

Second, exerting serious and speedy efforts to construct linked electricity networks among the Arab East countries and among the Arab Maghreb countries so as to benefit from the difference in the time element to improve the load factor of the Arab networks, reduce the reserves for each independent Arab network and strengthen and balance the inter-Arab networks.

This second point deals with a practical issue with which nobody disagrees, whether in terms of its benefit for each country individually or in terms of the possibility and ease of realizing it. Rather, some of what has been achieved (between Syria and Lebanon and between Syria and Jordan) and some of that for which efforts are being exerted (between Iraq and Kuwait and between Iraq and Jordan) confirms the benefit and the ease. But delay in implementing part of what should have been implemented earlier in this field indicates the gap between the existing reality on the one hand and the needs and aspirations, and even the capabilities, on the other hand and calls for an examination of the fact that the coordination and linkage among the existing networks is still in a state of faltering and stumbling. Will the call for coordination in the nuclear field be enough to establish the missing coordination among the progeny of the same forefathers--a progeny threatened in everything, even in its nuclear power capability?

8494
CSO: 5100/4738

RESULTS OF AGIP-URANIUM MEETING NOTED

Brazzaville ETUMBA in French No 604, 8 Aug 81 p 8

[Article by Andre Missamou]

[Text] Following the third meeting of the board of directors and the technical committee held on 20 November 1980, AGIP-Uranium (Ltd) [Italian Petroleum Enterprise], a Congo subsidiary whose research activities are concentrated in the field (Niari permit), has just held its fourth meeting from 20 to 22 July at the main office in Pointe-Noire.

Comrades Andre Massengo, general secretary of the Ministry of Mines and Energy, and Remy-Victor Okandze, director of mining, participated in the meeting, which was also attended by members of the AGIP-Uranium-Congo board of directors, a representative of AGIP-Uranium of Milan (Italy) and a representative of the regional political commissioner for Kouilou.

The first session, that of the technical committee, reviewed the lithological model used by AGIP for exploration on the Niari permit for geological and radiometric work done since the beginning of the mission and until 30 June 1981, and for helicopter, radiometric and geochemical prospecting and geological surveys.

The second session of the board of directors examined AGIP-Uranium's financial situation for the first period of this type-A research permit. The investment made it possible to step up research during the first 3-year period: the completion of all work in the field (spectrometry, geology, geochemistry and radiometry), in order to better interpret data during the second 2-year phase for the drafting of a final report. These conclusions will enable the AGIP-Uranium-Congo research mission to achieve a better situation in the field. It should be noted that the first phase of field prospecting is nearing completion, while the second, that having to do with the working up of data, will continue until 8 June 1984.

11,464
CSO: 5100/4952

NUCLEAR ACCELERATOR CENTER TO SERVE RESEARCH, MEDICAL PURPOSES

Johannesburg THE CITIZEN in English 27 Aug 81 p 11

[Text] CAPE TOWN. — The construction of the R16-million nuclear accelerator centre in Cape Town had reached an advanced stage, with cancer research already under way, Dr P D R van Heerden of the council announced.

The announcement coincided with the tabling of the MRC annual report in Parliament.

The nuclear accelerator centre at Faure on the outskirts of Cape Town is one of six similarly-sized centres in the world. However, it is unique in that it has a triple function — basic research in nuclear physics, manufacture of radio-isotopes for use locally and abroad, and applications in bio-medical scences.

New hope

According to Dr Van Heerden, the centre will give new hope to cancer sufferers and a 30-bed hospital for serious patients is to be built adjacent to the centre.

The centre, which can accelerate protons by about 200-million electron volts will concentrate on cancer research, particularly in the field of neutron therapy.

Patients suffering from certain cancers — such as cancer of the head and neck which did not respond well to the conventional treatment of radiation therapy, will receive neutron therapy.

Cured

Dr Van Heerden said it was hoped these cancers would be controlled by the treatment and in some cases cured. Preliminary tests at the centre were expected to begin in 1984.

MRC-supported research was underway to determine the effects of these radio-active particles on human tissue. This year R30 000 has been spent on the research to ensure that expertise and methods were built up before the accelerator centre became operational.

Wider treatment

"If we find that research in neutron therapy leads to a cure for a certain cancer, units for the wider treatment of patients will be set up throughout the country."

There had been "promising results" in this direction elsewhere in the world, but no other centre had the three complimentary functions.

The centre would operate by nuclear fission and would not have a reactor, such as the Koeberg nuclear power plant which used radioactive material, Dr Van Heerden said. — Sapa

CSO: 5100/4959

EARTHQUAKE DAMAGE TO KOEBERG STATION 'HIGHLY IMPROBABLE'

Johannesburg THE CITIZEN in English 22 Aug 81 p 4

[Text] **HOUSE OF ASSEMBLY. — An earth tremor with an epicentre closer than 8 km from the Koeberg nuclear power station and measuring more than seven on the Richter Scale, could crack the structure of the plant and cause a release of radiation.**

This was disclosed in Parliament yesterday by the Minister of Mineral and Energy Affairs, Mr F W de Klerk, in reply to a question by Mr Roger Hulley (PFP, Constantia).

Mr de Klerk said while it was theoretically possible that an earthquake with an epicentre closer to the site than 8 km and an abnormally high recording of more than seven on the Richter Scale might lead to the release of radio activity, such a quake was highly improbable in the vicinity of Koeberg.

"No earthquake of such nature has ever been recorded in South Africa. The highest recording ever has shown a reading of 6,3 on the Richter Scale for which provision has in fact been made in the safeguarding of Koeberg.

"The specific locality of the Koeberg plant has furthermore been determined with due consideration of the geological structure of the area which makes a serious earth tremor highly improbable within a radius of 8 km," Mr de Klerk said.

CSO: 5100/4959

EXPERT CRITICIZES SECRET SWEDISH-FRENCH NUCLEAR WASTE PACT

Stockholm DAGENS NYHETER in Swedish 4 Aug 81 p 2

[Article by Sven Aner]

> [Text] The secret Cogema agreement on processing spent Swedish nuclear fuel gives us only one guarantee--the unprocessed waste will be stored at La Hague until the end of December 1995. Under the agreement Cogema does not have to begin any processing before transport and storage of the waste has been approved by international authorities not yet in existence. So writes author Sven Aner.

I spent one Saturday in July slowly and painstakingly reading the so-called agreement of the 1980's between the French Cogema company and the Swedish SKBF [Swedish Nuclear Fuel Supply], the agreement that is supposed to regulate the processing of waste from Swedish nuclear reactors in the 1980's. I was probably one of the few people so occupied.

Unfortunately I do not have the entire agreement. It would be better to talk about it from the beginning. But with the help of the international environmental movement I have the introduction, clauses 9, 10, 12 and 13 along with several appendices. They cover quite a bit. And I can certainly understand why they have been stamped secret.

The text of the agreement is in English and there is nothing in the journals of the Industrial Affairs Ministry to indicate that there is a Swedish translation. Prime Minister Thorbjorn Falldin, who says himself that his English is inadequate, is unlikely to have read this massive and meaty text on his own and been much the wiser.

Satisfactory?

The agreement is supposed to concern what will happen to 620 tons of spent nuclear fuel to be removed in the 1980's from the reactors Barseback 1 and 2, Ringhals 1, 2, 3, and 4 and Forsmark 1 and 2. And since all these reactors with the exception of Ringhals 4 have already been supplied with nuclear fuel the intention has been to make the Swedish people believe that the agreement in the words of the provisional law "satisfactorily meets the need for processing spent nuclear fuel" and that the various reactor owners, state and private, "have shown how and where the processed highly-radioactive waste can be given absolutely safe final storage."

Let me state flatly that the agreement, the available sections of which lie before me, in no way meets the requirements of the provisional law. I would like to know the person or persons who have really read the agreement and can then claim that this is a satisfactory agreement.

It has been said during discussions of the various Cogema agreements that "no one can ask Cogema to provide complete guarantees" and that "one always has to reckon with acts of God," and so forth. What I will try to show here is something quite different--and considerably more serious.

Clauses

To the matter at hand. Clause 10.1 states (here as in following quotations I have been forced to use my own translation):

"In no case shall the processor (i.e. Cogema, Ed.) start processing work under this clause before the waste or the transformed waste resulting from the process or processes meets the criteria in clause 9.2 in the opinion of the processor."

The processor is Cogema, of course. If the provisions in clause 9.2 are not met no processing will be begun. What then does clause 9.2 say? Here it is:

"(The processor will return the waste) only if the waste can be given such form that it can be transported safely to the storage site for disposal there in accordance with rules to be specified by authorized national agencies and here both parties assume that such rules would agree with demands that may be determined by the proper international bodies in which the Swedish and French governments would be represented."

Let me interrupt for a minute. This says in other words that return shipments must be guaranteed by international authorities that do not exist today. And since 9.2 is linked to 10.1 no processing will begin until among other things these international authorities are appointed.

If Cogema started processing Swedish reactor waste today it would be breaking this very agreement on processing!

Come and Get It!

Clause 9.2 says further: "In connection with the development by the processor of various processes permitting such transport and storage of waste the processor can obtain and utilize appropriate technology being developed by United Reprocessors, Ltd. or certain other organizations."

Really? The technology being developed? The provisional law certainly doesn't talk about vague unknown developments. It talks about a satisfactory agreement.

In clause 10.2.1 Cogema promises to try to make a list that will satisfy the criteria in clause 9.2 but it says expressly that the company does not assume responsibility for the approval or disapproval of such a list by still nonexistent authorities in the indefinite future.

In other words: Cogema will not begin any processing before Cogema finds out that processed waste can be transported back to Sweden. Nothing says that Cogema will ever find this out.

The only real guarantee provided by the Cogema agreement (whatever that guarantee is worth) is that unprocessed waste will be stored at La Hague up until 31 December 1995. SKBF will then have to come and get it.

Why haven't I discovered this hidden Cogema reservation in the multibillion class during the many years I have been sifting through its papers? I can reply that the papers are many and complex and that I didn't have access to all of them. But I admit this is not a convincing answer.

This makes it all the more important that the debate be rekindled once more. For what I am charging here is much more serious than the criticism earlier directed against the Cogema merry-go-round: the UP3 plant in La Hague has not been built yet, perhaps the bedrock storage cavern has not been either, the eventual interim storage has not yet been planned (interim storage indeed--why plan for waste that will never be produced?), and so on.

Bluff

The agreement of the 1980's has never been anything but a builtin bluff. What are we doing in Sweden? We have wondered whether vitrified waste would tolerate eternal storage 500 meters down in the Swedish bedrock while at the same time our guardians were stating in cryptic but quite clear agreement language that such processing would never take place! We had a popular referendum about this. The state authorities used many millions of kronor on this referendum, the same state authorities who were well aware that no guaranteed processing existed.

How much of this was translated for Thorbjorn Falldin and how much of it did he understand?

What does Olof Palme know about this? My excerpts from the agreement of the 1980's are by no means supersecret but can be found in the editorial rooms of many publications and probably in political party offices as well.

How many people in this country have deliberately downplayed the regulation of the provisional law concerning a satisfactory processing agreement? The provisional law contains a threat of 2 years in jail but this penalty would apply only to someone who jumps the gun and starts up a reactor without the permission of the government. But here we have a surplus of government permits and apparently lying in general terms is not a criminal matter.

Does the government realize that all Swedish reactor operations should be shut down immediately while my charges are being looked into?

Does the government agree that all secret Cogema agreements should be published immediately?

For this processing agreement that prevents processing the Swedish Nuclear Fuel Supply people, i.e. the Swedish consumers of electricity, have already paid unknown millions, a sum that could mount to over a billion without any processing being done.

I am sending this article along with the relevant clauses to the Industrial Affairs Ministry. The clauses will be registered by the ministry and after that they become public documents.

6578
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SWEDISH PAPER CITES DANGERS IN NUCLEAR PACT WITH FRANCE

Stockholm DAGENS NYHETER in Swedish 17 Aug 81 p 2

[Editorial]

[Text] Who cares any more about the Swedish nuclear power waste? Not many Swedes apparently. Worry when the time comes. After us--long after us--the possible deluge.

A 1979 government explained to us, although to be sure they went against the opinion of the appointed group of expert geologists, that a few test holes drilled in Blekinge showed we had suitable bedrock for an entirely safe final storage of the waste. The provisional law was then regarded as having been met and justice had been done.

And a popular referendum in 1980 clearly gave the go-ahead for the production of up to ten times as much waste compared with what would have been produced if nuclear power had been phased out in the 1980's.

Thus we have managed to find political solutions to technical waste problems as yet unsolved by the United States and other countries. Only Sweden has Swedish bedrock.

But the French care about the Swedish waste, at least many of them do. They don't want to see their country used as an atomic waste depot for the whole world.

When spent Japanese nuclear fuel was unloaded in the Atlantic port of Cherbourg on 6 August--the anniversary of the bombing of Hiroshima--on its way to the La Hague plutonium factory it was met by violent demonstrations which were put down with the help of the riot police and tear gas as we saw in unpleasant glimpses on John Sune Carlson's "Summer Facts" on TV. Next fall according to plans Swedish nuclear waste will be shipped to the same location on a special ship now being built in Le Havre. Will there be riots and tear gas then too?

Perhaps not.

There is a possibility, a very slight one at present, that President Mitterrand and the Socialist Party will be forced by the opinion of the rank and file to live up to their own half promises during this year's election campaign to stop nuclear power expansion and the importing of waste. So far the big Plogoff station on the coast of Brittany has been written off entirely and five other reactor plants have been nipped in the bud.

But in July the French government declared that it would "honor" the fat processing contracts acquired by the partially state-owned Cogema due to its de facto monopoly position on the world market from Japanese, Swedish, German, Belgium, Dutch, Swiss and Spanish nuclear power companies whose reactor fuel tanks are threatening to overflow.

And when the hot years of 1977-79 unfolded the Swedish power industry was willing to sign up and pay almost any amount of money for contracts that appeared to meet the requirements of the provisional law. According to reporter Peter Hagerrot on "Summer Facts" Swedish power companies have paid around 250 million kronor so far for new storage tanks and the planned UP3 factory in La Hague--a pig in a poke if there ever was one--and the final bill for us should be around 1.5 billion. Those in the know in the power industry confirmed for DAGENS NYHETER that this is about the right amount but that inflation could almost double the amount. Well that's how it goes. It can't be helped if one signs contracts that guarantee payment for all costs plus 25 percent in profits or whatever.

According to the quickly hushed-up report on the secret Cogema agreement of 16 March 1978 made by TV Magazine on 10 October 1979 Sweden's costs for the La Hague venture (then estimated at 900 million) could rise to twice as much even if we don't send any spent fuel there at all and even if the French due to unmanageable problems with radiation in processing or other "circumstances beyond control" are forced to return the fuel in the same state in which it arrived.

The agreement cannot give any absolute guarantee that processed Swedish waste will be sealed in glass in France--a prerequisite for its burial in Sweden with Nuclear Fuel Supply's method I--as Sven Aner and other voices in the wilderness of partisan truce have been proclaiming. The waste can be shipped back to Sweden untreated if processing or vitrification does not succeed. But judging from paragraph 6.1 of the secret agreement we would at least not be forced to take back processed fluid waste. We can be grateful for that.

Plutonium, named for the god of death, is valuable only for breeder reactors or for manufacturing atomic bombs.

Sweden should not be part of building up a mountain of plutonium in this already evil world.

6578
CSO: 5100/2312

BRIEFS

SWEDISH WASTE SHIPMENTS HALTED--Pending a parliamentary debate of the new French nuclear power policy the government in Paris has halted all shipments of spent nuclear fuel to the processing plant in La Hague on the English Channel. Prime Minister Pierre Mauroy explained this on Wednesday. The debate on nuclear power will start on 15 October. On Wednesday the prime minister met with a delegation of people involved in treaties with La Hague and informed them of the government decision. Mauroy also promised that a scientific committee would be set up. It will be asked to investigate and consider the plant's safety. The committee will come under the minister of energy and submit regular reports so the government can be kept up to date on the situation at the facility. The La Hague facility is operated by the state company, Cogema. [Text] [Stockholm DAGENS NYHETER in Swedish 13 Aug 81 p 13] 6578

CSO: 5100/2312

NUCLEAR PLANT HALT IN LORRAINE CAUSES MIXED FRG REACTIONS

Frankfurt/Main FRANKFURTER ALLGEMEINE in German 6 Jul 81 p 8

[Article by Eckhard Kauntz: "The Blow to Cattenom; the Effect of the Preliminary Rejection by the Paris Government on the Expansion of Nuclear Power Plant Construction in the Region"]

[Text] Saarbruecken, 5 August--The decision by the Paris government to halt the expansion from two to four blocks of the nuclear power plant Cattenom in Lorraine until a parliamentary decision can be reached this fall, has evoked conflicting reactions in the affected region. According to their respective interests, Luxembourgers, Saarlanders and the Rhineland-Palatinate Land government are showing their happiness, while in Cattenom and Diedenhofen Gaullists and Communists demonstrated arm in arm against the Paris decision and were further reinforced in their anger by the Chamber of Industry and Commerce in Metz. The construction site in Cattenom has been the target of strike for several days; the workers demand that the Parisian decision be rescinded.

That the French border has become the dividing line between applause and criticism is indicative of how strongly the economic interests of the upper Moselle region determine attitudes towards peaceful utilization of nuclear energy. What is decisive for the outcray in Lorraine against the promise, now kept, by French President Mitterrand to review the ambitious nuclear program of his predecessor Giscard, is not so much the announced termination of 200 construction workers by Electricite de France, the builder in Cattenom. Even worse than the dismissal of those who had already been employed for the excavation for the third and fourth nuclear power blocks and the cooling towers belonging to them is the disappointment over the fact that Lorraine, which is plagued by economic problems, may now perhaps not be able to assume the role which the neglected eastern region was to have played after building a nuclear plant delivering four times 1,300 megawatts. Because after the full expansion of the four blocks, Cattenon--having met the demands of Lorraine--would have been able to export at least half of the produced power at a price, at which the power plants fueled with expensive domestic coal in neighboring Saar could not supply their customers.

The steel industry in Lorraine has laid off 50,000 employees in the last 5 years. Hopes for the establishment of new enterprises in the automobile industry have not been fulfilled. The importance of coal, once, in addition to Minette iron ore, the second leg of an economically strong Lorraine, has declined. Hence, it is understandable that the regional newspaper LE REPUBLICAIN LORRAIN published in Metz characterized the moratorium, decreed in Paris, on continued construction of Blocks III and IV as a "blow" to the eastern region, which "robs" Lorraine "of one of its last trump cards."

How much impact this trump card had already had is shown by the power purchase contract of the Baden Works, in which the Baden-Wuerttemberg Land has a 75-percent share, with the operators of Cattenom. This contract, which provided for the purchase of 5 percent of the power produced in the first two blocks, would have been followed by yet more delivery contracts in view of the difficulties in expanding nuclear energy in the FRG and in view of the price advantage of nuclear power.

Minister-President Zeyer (CDU) of the Saarland hopes that the "preliminary no" from Paris will result in a "final rejection" of Blocks III and IV. Saarland Deputy Minister-President Klumpp (FDP) has evaluated the Paris decision as a success for the efforts of Minister-President Zeyer, who had brought up the subject via the Chancellor during the latest German-French consultations with Mitterrand. Lafontaine, chairman of the Land SPD, called the decision a credible step, which showed that the new socialist government in Paris is mindful of the concerns of the border population. The spokesman for the state chancellery even assessed the Parisian decision as an "essential contribution to the consolidation of the friendship between Germany and France."

These reactions could give the impression that Paris has shown that it understands the arguments of the German and Luxembourg politicians and environmentalists. It might seem as if the theses of Professor Kloepfer of Trier has fallen on fertile ground in France. In a legal opinion Kloepfer drew attention to the rule in the law about international neighbors, according to which no state is allowed to undertake activities on its national territory which "cause not insignificant, not usual damage to the area of a neighboring state." "This is why," says Kloepfer, "considerable and unusual damage, such as could occur during normal operation of a nuclear power plant by way of exception (for example through harmful overheating of waters that flow across borders) and in case of an accident (for example radioactive contamination) ..., is contrary to international law and justifies fundamental obligations of restraint and compensation for damages under international law."

The fact that in addition to Blocks III and IV of the Cattenom reactor, which is only 10 kilometers from the German and Luxembourg borders, yet another 16 1,300 megawatt blocks in Pellerin on the Loire, in Choz on the Belgian border, in Golfech on the Garonne and in Civaux (Vienne) will not be further expanded or (as in Golfech) further planned, allows for another supposition as well. Perhaps the French nuclear power program, laid down in principle in 1974 and further expanded by former President Giscard d'Estaing, has meanwhile developed beyond the estimated demand. In that case the hesitation to further expand Cattenom would not be a gesture by Paris in the spirit of European cooperation but simply be a result of economic necessity. Despite the good regional cooperation in the Saar-Lorraine-Luxembourg area, there have so far been no indications that Paris should have been persuaded by outside influence in matters which concern its sovereignty.

11949
CSO: 5100/2298

MOTHBALLING EARLY NUCLEAR PLANTS CREATES DISPOSAL PROBLEMS

Frankfurt/Main FRANKFURTER RUNDSCHAU in German 23 Jul 81 p 4

[Text] Munich, 22 July (AP)--While several nuclear power plants are under construction in the FRG and some have already come on line, two first-generation nuclear power plants are already being phased out. Gundremmingen I in Swabia and Niederaichbach near Landshut--both in the immediate vicinity of the new plants of Gundremmingen II and Ohu I--are to be "mothballed" in the foreseeable future.

Niederaichbach was, to be sure, shut down as early as 1974 and Gundremmingen I in January 1977. But the demolition and, as the experts say, the "sealed cool-down period" are creating problems, because as long as the problem of final storage of the contaminated components has not been solved, final demolition cannot be contemplated.

In the case of Niederaichbach the permit for mothballing was applied for in March of 1981 at the Bavarian Environmental Ministry. As a spokesman for the ministry stated, certain conditions are connected with the permit to dismantle, for example recultivation of the entire area around the dismantled nuclear power plant.

Not until 1983, at the earliest, can the first demolition work at Gundremmingen begin, if all the permits have been approved. To be sure, fuel elements have already been removed to the French reprocessing plant La Hague. The reactor core--at Gundremmingen it contained 368 fuel rods--will then be unloaded and sealed off. The "sealed cool-down period" at Gundremmingen, as at Niederaichbach, will last 25 to 30 years. Not until then, that is to say in both cases around the year 2010, can the ruins of the nuclear power plants finally disappear.

11949
CSO: 5100/2298

NUCLEAR PLANT OPERATIONS, CONSTRUCTION PLANS GIVEN

Zurich NEUE ZUERCHER ZEITUNG in German 31 Jul 81 p 20

/Article: "Swiss Nuclear Power Plants 1980"/

/Text/ According to the annual report of the Swiss Atomic Energy Association (SVA), Swiss nuclear power plants obtained during 1980 once again "highly satisfactory" operating results while working at high capacity, a top performance in comparison with other international efforts in the field. The Goesgen nuclear power plant contributed to this result; it finished its first full year of operation with a minimum of breakdowns. Swiss nuclear generated electricity accounted for 28.4 percent of the country's entire production of electric power. Swiss nuclear power plants generated a total of more than 13 billion kilowatt hours, thus satisfying more than 5 percent of total energy requirements.

Last year the Beznau I nuclear power plant of the Northeast Swiss Power plant Company (Nordostschweizerische Kraftwerke A.G.--NOK) had a working efficiency of 86.5 percent, with net power production of 2.65 billion kilowatt hours, versus 2.66 billion kilowatt hours the previous year. The working efficiency of Beznau II resulted in a new production of 2.56 billion kilowatt hours versus 2.70 billion kilowatt hours during the previous year. The Muehleberg nuclear power plant operated the entire year without any interruptions worth mentioning. Its net power generation of 2.49 billion kilowatt hours represented a further improvement of the previous year's results. The first full year of operation of the Goesgen-Daeniken nuclear power plant was successful also: in 6,535 capacity operating hours it produced 5.96 billion kilowatt hours and transmitted it to its partners. The few interruptions were restricted to the steam circulating system which, according to the SVA, is not extraordinary for a thermic power plant in its initial phase of operations.

At the Leibstadt nuclear power plant, a great volume of equipment installation took place during the reporting year, after the rough brickwork had been essentially completed during the previous year. Shielding and interior construction are in progress. Biological shielding has been completed, the reactor pressure vessel put in place, and installation of reactor elements, conversion and steam lines is in progress. The condensor was installed, and installation of the turbine is nearing completion.

The Kaiseraugst Nuclear Power Plant Company applied for a general permit for its project on 25 July 1979. Inasmuch as plants which have obtained approval for location need a requirements statement in a simplified procedure, appropriate justification was appended to the application. If the Bundesrat gives its approval, the Bundesversammlung /Federal Assembly/ will have to deal with the general permit application for the Kaiseraugst nuclear power plant.

The Graben AG nuclear power plant has had its location permit since 31 October 1972 and all building and water use permits since the end of October 1977, authorized by Bern Canton where it is to be located. What is still needed is the nuclear construction permit and the general permit, newly required in the amendment to the Atom Law. The application for the general permit was published during the reporting year and notification of the cantons was implemented. The application for general permit is pending with the Federal authorities.

For the Verbois nuclear power plant project of S.A. l'Energie de l'Ouest-Suisse, Lausanne, preliminary clarification and preliminary studies proceeded at the project location, which had already been approved in 1974. For the Inwil project of the Central Swiss Power Plants, hydrogeological and meteorological investigations were essentially completed during the reporting year. Results were published in comprehensive reports.

Finally, further progress was made during the reporting year for the Plenar remote heating project for a heating consumer cooperative in the Olten region, using waste heat from the Goesgen nuclear power plant, and for the Transwaal project, with waste heat use from the Beznau nuclear power plant for use in the Aare and Limmat valleys. Special progress was made by the Refuna project, which plans to provide remote heating for the lower Aare Valley, with branches in Klingnau and Ruefenach, using waste heat from Beznau. It should be of practical usefulness as a demonstration model for Project Transwaal.

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 114

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WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 114

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LOK SABHA DISCUSSES NUCLEAR, DEFENSE PROBLEMS

Bombay THE TIMES OF INDIA in English 20 Aug 81 p 19

[Excerpts] The government is aware that the Bhabha Atomic Research Centre in Bombay, the Kota nuclear plant and Bombay High would come within the range of F-16 aircraft from Pakistani airfields, the minister of state for defence, Mr. Shivraj Patil, told the Lok Sabha today.

"The government is taking appropriate steps to meet the situation effectively", Mr. Patil told Mr. R. R. Bhole in a written reply. It was not in the interest of national security to disclose the details, the minister said.

Uranium offer: The minister of state for science and technology, Mr. C. P. N. Singh, said that India did not pursue the Soviet offer of enriched uranium because of its "existing agreement" with the U.S.

The offer was made in 1979 by the then Soviet Premier, Mr. Kosygin, during his visit to India.

Replying to another question, Mr. Singh said there were indications of uranium mineralisation in some areas of the Bastar district of Madhya Pradesh. No estimate of the reserves had yet been made. However, in the Bodal area of Rajnandgaon, reserves of about 2,000 tonnes had been estimated.

Libyan feeler denied: Mr. Singh denied a newspaper report that Libya had sought India's assistance in setting up a nuclear reactor.

N-plant site: The location of a nuclear power plant in the northern region will be considered after the site selection committee submits its report to the government, Mr. Singh said.

The minister told Mr. R. L. Bhatia that though Punjab had sought a nuclear power plant in its territory, it was for the site selection committee to choose the location of these plants.

He pointed out that the nuclear power development programme had to be integrated with hydel and thermal power programmes.

Reactors: Work on six nuclear reactors of 235 mw. each will be started during the sixth plan.

Of these, sanction has been issued for two reactors to be set up at Kakrapar near Surat at a cost of Rs. 382.52 crores, with a completion period of 125 months from the date of financial sanction.

A site selection committee has been set up to make recommendations for the other stations, Mr. C. P. N. Singh, minister of state for electronics, said.

Canadian uranium: Mr. C. P. N. Singh denied that India has made an arrangement with Canada for the supply of enriched uranium for fast-breeder reactors.

The minister assured Mr. M. V. Chandrashekhara Murthy that India had alternative measures for continued operation of the Tarapur atomic power plant, even if the United States stopped fuel supplies.

Liquid rockets: The government proposes to set up test facilities for liquid rockets at a location selected for the purpose in the Kanyakumari-Tirunelveli districts of Tamil Nadu, Mr. Singh said.

The project will be implemented after getting the necessary clearance, including that from the environmental angle, the minister told Mr. K. T. Kosalram in a written reply.

No serious threat has been posed by sea erosion to the Thumba rocket centre, Mr. Singh added.

CSO: 5100/7146

PARLIAMENT DISCUSSES TARAPUR PERFORMANCE, PACT

Calcutta THE STATESMAN in English 21 Aug 81 p 1

[Text] New Delhi, Aug. 20--Several Opposition members in the Rajya Sabha today pleaded for the abrogation of the 1963 agreement with the USA on the supply of enriched uranium in view of that country's failure to ensure continuous supply of the much-needed fuel for the Tarapur atomic power plant, reports PTI.

The Tarapur plant has been operating at 49% of its capacity because India had to stretch the available fuel, the Minister of State for Science and Technology, Mr C. P. N. Singh, told members during question hour. He said India was barred from reprocessing spent fuel or going in for alternative sources of enriched uranium so long as the agreement existed. But he assured the House that the Government was examining the possibility of using other types of fuel such as mixed oxide to keep the reactor going.

Mrs Gandhi told the House that the performance of the Tarapur plant in 1980-81 at 49% utilization was comparable to that of similar reactors in other parts of the world. She said in a written reply that except for the Tarapur plant, other atomic power plants in the country used indigenous nuclear fuel. However, development work on indigenous mixed oxide fuel for the Tarapur plant has been carried out and found feasible, she added.

In the Lok Sabha today, Mr P. V. Narasimha Rao, External Affairs Minister, said that the Government felt that nuclear cooperation with the USA should be handled bilaterally. He said that the U.S. nuclear policy declared in July this year did not affect the posture of the US Administration regarding the nuclear cooperation agreement reached between the two countries in 1963.

CSO: 5100/7148

AEC CHAIRMAN WRITES ON INDIA'S NUCLEAR POLICY

New Delhi PATRIOT in English 17 Aug 81 p 4

[Text]

INDIA is actively participating in international cooperative efforts to strengthen and streamline methods for safety and surveillance in nuclear power plants.

According to Atomic Energy Commission chairman H N Sethna, although India has not faced problems of public acceptance of nuclear power, there has been no question of complacency on the issue.

Physicists and radiation protection groups have already established stringent standards and norms to ensure against hazards to public health, Dr Sethna says in an article assessing India's nuclear policy, on the occasion of the Independence anniversary.

These safety standards will be an integral part of the projected power plants through which India hopes to take nuclear power generation from the current 1,300 MW to about 10,000 MW in the next two decades.

According to Dr Sethna, the design of the Narora nuclear plant is being standardised and will be repeated for two additional projects before India goes on to construct reactors of 500 MW based on totally indigenous design.

The Narora power plant, the fourth in the country consists of two 235 MW heavy water reactors. These reactors have several new design features and concepts, including earthquake resistant super-structures and reactor components.

The Narora reactors feature an integral calandria-end-shield assembly, two independent fast acting shut down systems for safety and reliability and a simplified water-filled calandria vault.

The third power plant, being built near Madras is approaching completion. According to Dr Sethna, the first of its 235 MW units is expected to attain criticality next year. The plant features many innovations to improve the economy and safety factors.

The atomic energy chief has defended the continuing development of natural uranium fuelled reactors in the country. India is one of the very few countries at present continuing with these types of reactors.

According to Dr Sethna, in formulating the strategy for nuclear development in India, the country had to take into account that while its uranium resources were rather modest (53,000 tonnes of which 30,000 tonnes are reasonably assured), the country had the largest thorium reserve in the world.

A three-stage nuclear fuel cycle strategy was therefore accepted. In the first phase were to be installed natural uranium reactors to be followed in the second stage by fast breeder reactor using the plutonium produced in the first stage together with the uranium-238 isotope or the abundant thorium. The eventual third phase will use the self-sustaining thorium with uranium-233 cycle.

Dr Sethna says that while the nuclear programme has been effected by "restrictive trade practices and unilateral embargoes on nuclear supplies by certain countries", in the long run they have helped strengthen and accelerate India's programme for complete self-sufficiency in the nuclear field.

In the development of the Tarapore, Kota and Madras plants, the import content has been progressively reduced. An additional benefit has been that Indian industry and technology has been helped to mature to the sophistication and quality control necessary in the nuclear age.

CSO: 5100/7145

RAJASTHAN HEAVY WATER PLANT LEAKAGE REVEALED

Bombay THE TIMES OF INDIA in English 20 Aug 81 p 1

[Text]

KOTA, August 19 (PTI): Two to three tonnes of heavy water have leaked out from the heavy water plant of the Rajasthan Atomic Power Plant (RAPP) unit I at Rawat Bhata, near Kota, on August 5, resulting in the shutting down of the unit, according to Mr. M. S. R. Sharma, officer in-charge of the RAPP.

The leakage had occured owing to heavy fluctuations in the power supply, he told PTI here today.

Efforts were now on to resume power generation in the unit from tomorrow, he said. About 70 to 80 Mw of power would be generated initially once the unit went on stream.

Mr. Sharma said there was nothing to panic since the entire quantity of the leaked out heavy water had remained within the reactor and had not flowed into the nearby river or mixed with the atmosphere.

He denied that some employees working there suffered radiation. He said part of the leaked out heavy water had already been purified and pumped back into the heavy water unit and the remaining quantity was in the process of purification. This would be pumped back within this week, he said.

CSO: 5100/7146

BRIEFS

NUCLEAR PLANT SAFETY--Pending consideration of the creation of an Atomic Energy Regulatory Board, the existing Safety Review Committee (SRC), which presently regulates the safety aspects of all the nuclear establishments, has recently been reconstituted and its terms of reference revised, reports PTI. Prime Minister Indira Gandhi said in a written reply to Mr Jagdish Tytler that the reconstituted SRC has been given the task of carrying out the regulatory and safety functions envisaged for the Government by the Atomic Energy Act, 1962 to ensure safety of the operating personnel, members of the public and the environment. [Text] [New Delhi PATRIOT in English 10 Aug 81 p 7]

CSO: 5100/7147

U.S. MAY SUSPEND ENRICHED URANIUM SHIPMENT, URENCO MAY SUPPLY

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 27 Aug 81 p 7

[Article by Paulo Andreoli: "United States Threatening To Suspend Uranium Shipments"]

[Text] The United States may suspend the shipment of new lots of 3-percent enriched uranium for the nuclear reactor of the Angra-1 power plant, purchased by Brazil from Westinghouse, an American outfit, scheduled to go into commercial operation in December. The United States government, according to confidential information from a reliable diplomatic source, would make the future supply of enriched uranium to be shipped to Brazil contingent upon the international safeguards instituted by the International Atomic Energy Agency primarily on what Brazil considers "national nuclear units."

In the meantime, however, according to disclosures made in Sao Paulo by a government source connected with nuclear matters, Brazil already has a contract with the European URENCO consortium (Holland, Great Britian, and Germany) for the supply of sufficient uranium to meet the country's needs in case the United States should not follow through on its commitments (see the article below).

The intention of the United States to suspend shipments, if Brazil does not accept the safeguards (the first lot of enriched uranium has already been delivered to Brazil) was expressed officially to Itamaraty [Brazilian Foreign Office] by American authorities last week. It is correct that United States Undersecretary for Inter-American Affairs Thomas Enders took up nuclear questions with Brazilian authorities and a summary of the results of his talks was sent via telex to the United States State Department, as was announced in Washington.

The thing that divides Brazil and the United States apparently involves only questions of a legal character regarding the obligatory nature of Brazil's commitment to submit its domestic nuclear power units to inspection by the International Atomic Energy Agency. According to the diplomatic source, the disagreements are serious and seem to be heading for even more serious political complications since neither the Brazilian authorities or the American authorities indicated that they were prepared to yield on their intentions.

Commitments

The Brazilian government seems to be prepared not to accept anything beyond what it has already promised to comply with. It has already promised to comply with the explicit safeguards in the trilateral accord with the United States and with the International Atomic Energy Agency signed on 5 October 1972 ("Cooperation Agreement Relating to Civilian Uses of Atomic Energy between the IAEA, Brazil, and the United States, Concerning the Application of Safeguards," Decree No 71.207, replacing the earlier agreements, constituting the first agreement in Brazil relative to the purchase of a nuclear reactor for the commercial production of electric power, together with U-235 fuel).

The United States government believes that Brazil--by virtue of the commitments which it assumed in the trilateral accord--would be prepared to comply at least with the IAEA safeguard system, known formally as INFCIRC/66/II Rev (this is a circular report, known by this abbreviation, mentioned as such in the international agreements).

Exemption

International agreements on safeguards are generally concluded on the basis of the model of the agency's safeguard system, approved by the Board of Governors of the IAEA. INFCIRC/66/II Rev is divided into six parts, Professor Guido Soares, a specialist in nuclear law, recalled. Paragraph 31 of the circular establishes the rules as to exemption from safeguards: for up to 1 kilogram of special fissile material which is turned into 1 or more kilograms of (a) plutonium, (b) uranium enriched 20 percent or more, calculated through the multiplication of its weight with its enrichment, (c) uranium with enrichments below 20 percent, calculated by multiplying its weight five times with the square of its enrichment, (d) 10 metric tons of natural uranium and uranium reduced beyond 0.5 percent, and (e) 20 metric tons of thorium.

The Brazilian government already officially admitted that it has about 100 tons of natural (unenriched) uranium, partly in the form of yellow cake and partly in the form of uranium dioxide, pure in nuclear terms, processed at the IPEN (Nuclear and Energy Research Institute) in Sao Paulo. In this case, if the Brazilian government were to submit to the agency's safeguard system, it would have to provide satisfaction on this strategic material (where it is located, what the total volume is, changes in the volume, sale, exports, etc.). Brazil also has considerable stockpiles of thorium in excess of 20 tons; by submitting to the safeguards, it would have to satisfy the IAEA on that mineral. As for plutonium, Brazil does not have it--at least it is believed that it will have it only after the burning of enriched uranium in its nuclear reactors.

Debate

The United States government also argued that it feels that it is impossible to supply new shipments of enriched uranium to Brazil because domestic legislation prohibits that in connection with the Nuclear Energy Act of 1978. The Brazilian government in turn made it clear that, by virtue of the trilateral accord, Brazil would have to subject to international inspection the equipment, materials, and nuclear installations "transferred by the United States" and not the "national" equipment, materials, and installations, that is to say, those that were developed domestically and not purchased from the United States.

In the trilateral accord, Brazil and the United States agreed on preparing a complete inventory of what is being transferred. And only that material should be subjected to agency inspection.

This is why Brazilian authorities feel, according to the diplomatic source, that they do not have to submit to the safeguards. And they recall that Brazil did not sign the Nuclear Arms Nonproliferation Treaty of the IAEA, which is why it is not obligated to accept inspection of what it considers "national nuclear units."

The concept as to what "national nuclear units" are certainly will trigger a serious debate between the two countries. Without an understanding on that and other technical issues, the Angra-I nuclear power plant, which is already considerably behind schedule, runs the risk of winding up without any fuel for some time. It remains to be determined where and how Brazil is going to get that enriched uranium. We must not forget that, to ensure the supply of enriched uranium for the nuclear units acquired from Germany, Brazil will have to make a political effort abroad to frustrate the intention of the Dutch government which refused to supply enriched uranium to Brazil for the same reasons now alleged by the United States. (Germany, together with Great Britain and Holland, make up the URENCO consortium which produces enriched uranium for these three countries.)

It is true that, without a guarantee of enriched uranium supply, the reactor at Angra-I will not go into commercial operation. Its delay, so far caused by technical problems, might be extended further due to political problems. The diplomatic misunderstandings as a matter of fact are more political than legal; if the United States government were not interested in "pressuring" Brazil, the restrictions which now come up certainly could be gotten around. It so happens that, in addition to the legal arguments in support of the application of safeguards, the Americans can threaten with rather objective reprisals, such as cutting the supply of enriched uranium and, at least for some time, blocking the generation of nuclear energy in Brazil.

URENCO May Supply Angra-I

"Anticipating problems in the supply of enriched uranium from the United States, to supply the Angra-I nuclear power plant, the Brazilian government has contracted with the European URENCO consortium (Holland, Great Britain, and Germany) for shipments of uranium to meet Brazilian needs in case the Americans should fail to come through on their contract commitments," it was disclosed yesterday in Sao Paulo by a government source connected with nuclear questions. The same informant added that Brazil already has available the equivalent of 1,830 UTS (separation work units) and the option of having another 1,800 UTS, corresponding to the output of enriched uranium. These quantities are enough to meet the needs at Angra-I "for the entire period of its useful life."

The supply of American enriched uranium for Angra-I, according to that same source, is based on formal contracts signed between Brazil and the United States. The refusal to ship these supplies "will imply contract penalties, regardless of what the arguments are." The Brazilian government has begun to prepare itself for the possibility that the United States may stop shipments "ever since the Carter administration" and has tried to assemble "strategic stockpiles of enriched uranium by negotiating for supplies from URENCO for some time now."

The source also made it clear that it would be difficult for government authorities to admit the existence of "available strategic stockpiles" because that would place the German government in an unfavorable situation on the international scene, "forcing it into a clash with the Americans." This clarifying note, the source continued, is necessary to prevent the preoccupation that the Brazilian nuclear program might be interrupted as a result of the failure to obtain enriched uranium for the first Brazilian power plant "which in effect will not happen."

The first enriched uranium shipment, totalling 50 tons, has already been delivered to Brazil by the United States. It is stored, according to information obtained from Furnas Electric Power Plants, Inc, in the "fuel building" next to the Angra-I nuclear reactor. The first charge at Angra-I will be approximately 50 tons and each year about 15 tons will be "burned" in the reactor's core. At the end of 3 years however the entire charge will already have been replaced.

According to the press office at Furnas, Angra-I "is practically finished and can go into operation (tests with fuel) between 15 September and 15 October; this would not happen only because of the uncertainty regarding the next charges of enriched uranium." The source also confirmed that there are misunderstandings as to supplies from the United States.

IPEN and Safeguards

The irradiated uranium reprocessing unit of the IPEN, located at the University of Sao Paulo, is a national nuclear unit and therefore not subjected to international safeguards--or is it? Professor Hernani Amorim, director and superintendent of IPEN, feels that "the institute's irradiated material safety analysis laboratory, used for personnel training, is a domestic nuclear unit, that is to say, it was not procured in a ready-made fashion but was assembled with parts acquired from France, purchased and donated by Germany, and some were even manufactured in Brazil." He also noted that the assembly of this facility, by Brazilian engineers and scientists, was possible due to guidelines obtained in international literature on reprocessing units.

As for the unit's production capacity, Hernani Amorim prefers not to talk about that. He could not say whether the unit, for example, would be able to separate 1 kilogram of plutonium in a year. He asserted that "the plutonium separation capacity would seem to be proportional to the irradiated uranium which the reprocessing unit could supply. After completion and licensing by the National Nuclear Energy Commission, the laboratory would, under special conditions, have to separate a quantity larger than originally estimated for manpower training in irradiated uranium separation activity." The important thing, as far as the professor is concerned, is to realize that the IPEN unit was designed for testing the process and not for production.

5058
CSO:5100/2315

NUCLEAR WASTE SITES TO BE DETERMINED ONLY IN FIVE YEARS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 22 Aug 81 p 24

[Text] The areas of "sites" for Brazilian atomic waste disposal will be determined only within 5 years, after the completion of a geological mapping effort and other studies which are now being carried out by the country's research institutions. By then, in 1986, the Angra-I plant will have produced a considerable quantity of solid waste (clothing, shoes, equipment, and other materials to be discarded) plus 85 tons of irradiated (burned) nuclear fuel with high radioactivity.

The report as to the time for the selection of waste disposal areas was submitted yesterday in Angra dos Reis, in the State of Rio de Janeiro, by the director of the Nuclear Installations and Materials Department, CNEN (National Nuclear Energy Commission), Jose Julio Rosenthal. He added that studies aimed at this objective have already been going on for the past 5 years and that it will take a decade to complete them.

The solid, low-radioactivity waste, Rosenthal explained, will be processed and solidified initially in 180 drums of 200 liters, each, and will be stored in a pool built at the Angra-I power plant. The same storage process, according to the CNEN engineer, will be used with relation to gaseous waste, coming out after the reprocessing of the fuel burned by the reactor. But, since there is no reprocessing (the specific spot for that plant has not yet been selected although NUCLEBRAS [Brazilian Nuclear Corporations] announced that it will be ready in 1986), the burned fuel will be stored in the pool at Angra-I.

Time Required

The CNEN engineer displayed recent standards, issued in 1981 by the IAEA, permitting both waste and burned fuel to remain within the plant's pool "for the time necessary." He said that there was never any obstacle as to that aspect of the issue.

Rosenthal emphasized that "much work remains to be done" even after we pick the places for waste disposal. He maintained that many engineers--including others from the Earth Sciences Institute of the University of Sao Paulo, the Federal University of Rio de Janeiro, and the Mineral Resources Research Company--are involved in the most varied tasks. The entire effort is being carried out under the responsibility of the CNEN whose alternate site study groups perform an outstanding function.

The highly skilled human resources mobilized for this survey, the engineer said, will provide conditions for determining the disposal areas within the basic requirements of international standards.

5058
CSO:5100/2315

BRIEFS

FOREIGN FINANCING OF URANIUM PLANT--Brasilia. There are countries that are interested in financing a nuclear complex in Brazil through a guaranteed supply of Brazilian concentrated and enriched uranium, Mining and Energy Minister Cesar Cals disclosed yesterday. Questioned as to whether one of these countries might be Iraq, he confined himself to smiling, avoiding any admission or denial. He explained that these countries are interested in guaranteeing their supply with concentrated and enriched uranium from Brazil "by the middle of the decade of the nineties." Minister Cesar Cals defended the choice of Ceara as the ideal place for the nuclear complex, saying that "this is the most viable undertaking which we have at this moment in Brazil in terms of atomic energy because uranium is found there in association with phosphate and we could have an integrated project here which would help in promoting the economic viability of uranium mining." He also noted that the project will not be completely a state project because phosphate mining and phosphoric acid production, involving the raw material for phosphate-containing fertilizer, which would be handled by Petrofertil, already has produced various proposals from private enterprises based in Brazil. The portion involving mining and processing of uranium however would be controlled by NUCLEBRAS [Brazilian Nuclear Corporations] which has the monopoly. The study for the construction of the nuclear complex at Itatiaia is still in the Ministry of Mining and Energy and has been approved by NUCLEBRAS and Petrofertil, according to the minister. He expects to submit it to President Joao Figueiredo before the end of the year. [Text] [Rio de Janeiro JORNAL DO BRASIL in Portuguese 18 Aug 81 p 16] 5058

CSO:5100/2315

UNIVERSITY REACTOR FOR NUCLEAR RESEARCH TO BE INSTALLED

Port-of-Spain TRINIDAD GUARDIAN in English 20 Aug 81 p 5

[Text] Kingston Weds (CANA)--The Mona Campus here of the University of the West Indies (UWI) is to install a small nuclear reactor by the middle of next year, for use in research work in such areas as medicine, agriculture and geology, UWI Pro-Vice Chancellor, Prof. Gerald Lalor, has disclosed.

Prof Lalor, in a luncheon speech to Jamaican insurance underwriters, said the money for the reactor was being provided by the European Economic Community (EEC). He did not say how much it would cost.

"It will not be a reactor for energy or the generation of electricity or anything like that," Prof. Lalor said. "It is one for use as a research reactor in medicine and geology and what not."

Complete Survey

The university official said the first programme planned for the reactor was a complete survey of Jamaica's mineral potential.

It could serve, he said, as an accurate, high-speed analytical tool, and it was the university's intention to test several thousand geological samples, the results of which would be computerised and a contour map of mineral deposits plotted.

"It will give us a clear idea of what mineral potential there is," Prof. Lalor added.

He said such a survey would have immediate spinoff, with one benefit being the identification of areas with trace metals which could be of importance to agriculture.

Prof. Lalor said, too, UWI was actively looking into the possibility of using all forms of modern communication technology for a greater impact on education.

The university was convinced that the education system could not provide solutions to the region's problems working through conventional methods only.

CSO: 5100/7553

BRIEFS

MONITORING OF KOEBERG RADIATION--Yesterday, speaking in Capetown, Executive Committee Member Hernus Kriel, who is charged with local management, said that the Cape Province's City Council will be purchasing equipment for monitoring the danger of radio active radiation from Koeberg. In answer to a question raised in the Provincial Council he said that EVKOM [Electricity Supply Commission] had discussed the question of nuclear waste with Capetown health officials. Besides the National Advisory Committee, charged with nuclear safety, there are other committees which are also monitoring Koeberg. These committees consist of technical experts and representatives of local and provincial authorities. [Text] [Capetown DIE BURGER in Afrikaans 12 Aug 81 p 7] 7964

CSO: 5100/4956

BRIEFS

FIRM TO PROSPECT FOR URANIUM--More prospecting for uranium in the country is expected to start shortly when an agreement is concluded between Romania and Zambia, it was learnt in Lusaka yesterday. Romanian's new Charge d'Affairs to Zambia, Mr Gheorghe Lupes said experts from his country and their Zambian counterparts were still negotiating on the form that the agreement should take. He was answering questions on the progress of the negotiations at a Press conference he called on the eve of Romania's national day which falls on August 23. He said a Romanian firm, Geomin, was ready to start prospecting for uranium and other minerals as soon as the agreement was reached. He did not, however, indicate how long the negotiations would take. [Excerpt] [Lusaka DAILY MAIL in English 22 Aug 81 p 1]

CSO: 5100/4960

LONG-TERM MANAGEMENT OF RADIOACTIVE WASTES REVIEWED

Duesseldorf ATOMWIRTSCHAFT ATOMTECHNIK in English Aug-Sep 81 pp 493-498

/Article by J.M. Lavie: "The Long-Term Industrial Management of Radioactive Wastes in France"/

/Text/

1. The Need for a National Agency

Although the history of radioactive waste management is not different from that of the management of other wastes, its passage to the industrial scale has sparked several debates and controversies in recent years, both in political circles and in public opinion. This reaction may be paradoxical, since the relatively small quantity of wastes produced by nuclear power plants and the reliability of the available management techniques, in comparison with wastes generated by other sources of energy, should suffice by themselves to justify the choice of nuclear power to guarantee the satisfaction of energy needs and also those of the human environment. This can be shown by a few figures: France produces about 1 million tons of wastes of all types daily, whereas the cumulative volume of radioactive wastes generated by nuclear power plants up to the year 2000 will be less than 1 million cubic meters, including 2000 cubic meters of vitrified high activity wastes. Sewage purification alone produces 700 kg of sludges per capita each year, constituting a danger to the environment and costing vast sums to remove. These 700 kg of sludges per capita per year can be compared to one liter of radioactive wastes and to the few grams of vitrified wastes produced per year and per capita supplied exclusively with nuclear generated electricity.

However, the consequences of these debates, to which governments have committed their credibility which sometimes ceased to exist, and the acceptability of the industrial alternatives which are or which will be proposed, condition the indispensable growth of nuclear power.

These considerations, and the urgency of devising appropriate industrial solutions for removing these wastes, which form the final and vital industrial link in the development of the French nuclear power program, have induced the authorities to create an *Agence Nationale pour la Gestion des Déchets Radioactifs (ANDRA)*. In actual fact, the complete and indispensable control of all problems raised by long-term waste management could only be achieved:

- within an industrial organization, owing to the scale of the market created by the vigor and scope of the French nuclear power program, with the commissioning of one power plant every two months and subsequent fuel reprocessing, the first effective link in waste management,
- within a public agency, a non-profit organization, in order to guarantee the stringent application of safety requirements, permanent long term responsibility, at a fair cost,
- on the national level, to ensure the necessary cooperation between the different organizations concerned in the development of industrial solutions.

2. The National Agency for Radioactive Waste Management (ANDRA)

Formed within the *CEA* by an interministerial order dated 7 November 1979, within the framework of legislative and regulatory provisions already in force, ANDRA is responsible for industrial operations related to long term radioactive waste management, and in particular with:

- the design, siting and construction of new long term storage centers, and the performance of all investigations required for this purpose, especially with respect to production,
- the management of long term storage centers, either directly or through the intermediary of third parties acting on its behalf,
- the establishement, in collaboration with waste producers, of radioactive wastes packaging and storage specifications, prior to their removal to the long term storage centers (this is the link between upstream management and downstream management),
- contribution to research, development and operations concerned with long term radioactive waste management processes as well as future developments.

The organizations that have been set up reflect the determination of the authorities (fig. 1):

- to see the latest developments of science and technology applied to radioactive waste management; this is the role of ANDRA's Scientific and Technical Council, presided by the Chairman of the Atomic Energy Commission
- to associate leading personalities and the different organisms generating the wastes in the waste management programs; this is the purpose of ANDRA's Management Committee, presided by the Chairman of the Board of the CEA.

The creation of ANDRA also reflects the decision of the authorities to make a clear separation between monitoring and regulation activities and those related to industrial operations. It marks the industrial maturity of long term waste management. ANDRA takes charge of recommending policies and industrial disposal alternatives, and the safety authorities are responsible for giving their opinion to the supervisory authority that decides on the matter.

A storage center is a fully-fledged industrial installation, and has since 1963 been considered as a Basic Nuclear Facility. Its nuclear operator, ANDRA, which cannot delegate its responsibilities, its subject to regulations governing the Basic Nuclear

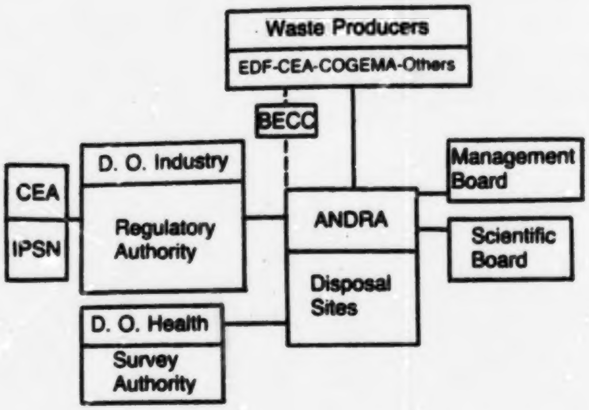
Waste Producers
EDF-CEA-COGEMA-Others
BECC
D. O. Industry
Regulatory Authority
CEA
IPSN
ANDRA
Disposal Sites
Management Board
Scientific Board
D. O. Health
Survey Authority

Figure 1: Organisation Chart.

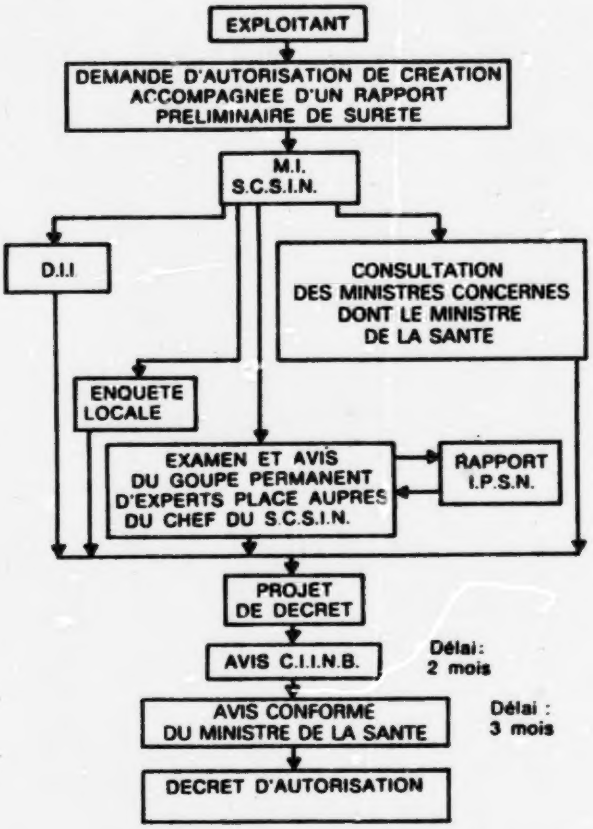
EXPLOITANT
DEMANDE D'AUTORISATION DE CREATION ACCOMPAGNEE D'UN RAPPORT PRELIMINAIRE DE SURETE
M.I.
S.C.S.I.N.
D.I.I.
CONSULTATION DES MINISTRES CONCERNES DONT LE MINISTRE DE LA SANTE
ENQUETE LOCALE
EXAMEN ET AVIS DU GOUPE PERMANENT D'EXPERTS PLACE AUPRES DU CHEF DU S.C.S.I.N.
RAPPORT I.P.S.N.
PROJET DE DECRET
AVIS C.I.I.N.B.
Délai: 2 mois
AVIS CONFORME DU MINISTRE DE LA SANTE
Délai : 3 mois
DECRET D'AUTORISATION

Figure 2: Scheme of the Procedure Related to Creation Authorization of Basic Nuclear Facilities.

Facilities (fig.2) both for the licensing procedure for the creation of a new storage center, or controls of the existing center, by the SCSIN (Service Central de Sûreté des Installations Nucléaires) for safety aspects and by the SCPRI (Service Central de Protection contre les Rayonnements Ionisants) to check the absence of impact on environment.

ANDRA is a light organization whose activity is centered on a high-level management role for the achievement of optimization on the economic and safety levels. ANDRA employs about 20 peoples, including 15 management staff (fig. 3).

3. The Need for an Overall Industrial Approach

It appeared very early, as soon as the nuclear power programs were launched, that the cost of waste disposal in the strict sense of the term was only a fraction of about 10 to 20% of the total cost of the waste management system (treatment + conditioning + disposal), and that this cost was directly related to the disposal concept implemented. Hence the need to determine the disposal concepts in advance, in order to design up-stream management (treatment + conditioning) more efficiently and more economically especially in the reprocessing facilities and nuclear power.

The optimization of waste management as a whole, from the economic and safety standpoints, thus requires its industrial approach to be consistent and therefore all-encompassing, concerned at once and with equal urgency with the concepts and identification of storage centers as well as waste treatment and packaging. This requires anticipation. It is vain to try to improve treatment and conditioning techniques without first determining the concepts and typical characteristics of the storage center. ANDRA's industrial approach is part of a consistent policy of optimized integration of all the different factors involved in waste management in the broad sense of the term, from their initial source, all the way to the final storage center. This is achieved by cooperation between Producers and ANDRA, as desired by the authorities.

4. Industrial Management Concepts

The problems raised by long term radioactive waste management are essentially no different from those raised by the management of all other wastes, with two significant advantages for radioactive wastes, apart from their small volume, their radioactive decay and the reference to natural radioactivity that many toxic chemical wastes that are complete newcomers to the earth lack.

The basic rules governing long term waste management are to protect mankind today and tomorrow, to preserve his environment and his resources, and to minimize the burden on future generations. This means:

- on the prevention level: the limitation of waste production to the strict minimum, by sorting and by a possible volume reduction.

- on the protection level: the insertion of barriers between the environment and these wastes, to guarantee their confinement throughout the time required for their radioactivity to decay.

These universal principles having been stated, it remains to implement them on the industrial level, and this depends on the art of management, namely, the skill of the manager. In this respect, as for any other industrial product, it is important:

- to inventory and identify the needs, namely, the industrial market and this is the purpose of waste production and delivery forecasts, which cover not only the volumes but also the characteristics, as well as disposal deadlines,
- to define the disposal concepts which are both accessible

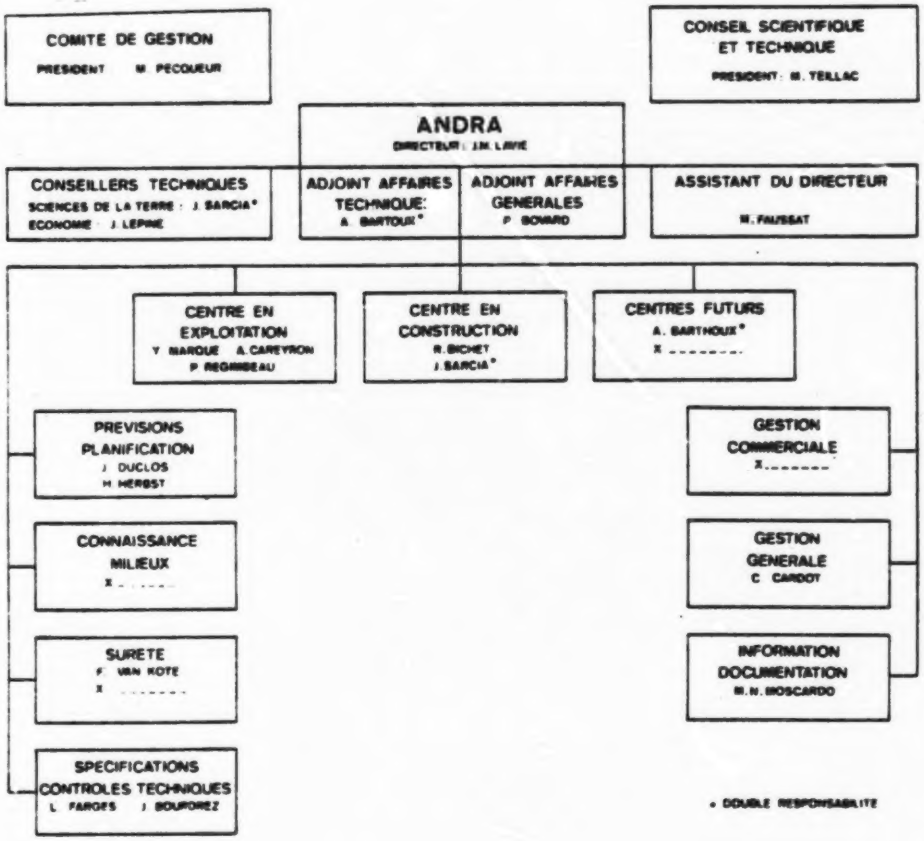
COMITE DE GESTION
PRESIDENT M. PECQUEUR
CONSEIL SCIENTIFIQUE ET TECHNIQUE
PRESIDENT: M. TEILLAC
ANDRA
DIRECTEUR: J.M. LAVIE
CONSEILLERS TECHNIQUES
SCIENCES DE LA TERRE: J. BARCIA*
ECONOMIE: J. LEPINE
ADJOINT AFFAIRES TECHNIQUE:
A. BARTOUX*
ADJOINT AFFAIRES GENERALES
P. BOVARD
ASSISTANT DU DIRECTEUR
M. FAUSSAT
CENTRE EN EXPLOITATION
Y. MARQUE A. CAREYRON
P. REGIMBEAU
CENTRE EN CONSTRUCTION
R. BICHET
J. BARCIA*
CENTRES FUTURS
A. BARTHOUX*
X ________
PREVISIONS PLANIFICATION
J. DUCLOS
H. HERBST
CONNAISSANCE MILIEUX
X ______
SURETE
F. VAN KOTE
X ______
SPECIFICATIONS CONTROLES TECHNIQUES
L. FARGES J. BOUFOREZ
GESTION COMMERCIALE
X ______
GESTION GENERALE
C. CARDOT
INFORMATION DOCUMENTATION
M.N. MOSCARDO
* DOUBLE RESPONSABILITE

Figure 3: Responsibilities.

technologically, reasonable from the economic standpoint, and satisfactory from the safety and environmental standpoints, but also and above all, sufficiently simple and clear to be understood easily by public opinion. This definition of concept must try to optimize and minimize the radioactive exposure of workers and also the populations of today and tomorrow,

- to select predetermined sites, or at least possible types of sites, meeting the selection criteria deriving from the disposal concepts adopted for the establishment of the long-term storage center. This choice is the bottleneck in the disposal of radioactive wastes, and not their volume.

Once this prospective approach has been made and accepted by the safety authorities, the supervisory authorities and, if possible, the majority of the public, together with the waste producers themselves, it becomes possible to define the following in a consistent, optimized manner:

- the technical specifications that must be met by the conditioning and packing of the different waste categories, preparatory to their being taken over by ANDRA for disposal in long-term storage centers. Each type of package will be covered by a procedure for securing authorization from ANDRA. In addition to the characteristics of the package and the source of the wastes contained, the authorization file will include the process book relating to its preparation;
- quality assurance controls that ANDRA has or will have performed to guarantee the compliance of the package to the authorization file, requiring the availability of testing and inspection facilities.

Furthermore, this prospective approach will lead to a research and development plan applied to long-term waste management of which it is important to ensure that the objectives and deadlines are adequately covered by national or multinational programs financed by resources other than those of ANDRA, or other credits must be secured and other research and development facilities set up?

Now that these universally applicable concepts have been summarized briefly, let us examine the scope of the market, namely, ANDRA's work program, and then go on to France's policy in meeting the needs expressed.

5. ANDRA's Work Plan

With respect to the long-term management and design of final storage centers, radioactive wastes can be classified in three major categories as a first approximative:

- Wastes containing short half live radioelements, less than 30 years (essentially beta and gamma emitters), of which the long half-life radioelement concentration (essentially alpha emitters) is lower than the limits set for the site in question by the safety authorities. These wastes, commonly referred to as "low and medium activity wastes".

- Wastes containing a significant amount of long half-life radioelements (over 30 years) with high potential harmfulness. In practice, and to simplify the terminology, this category corresponds to wastes containing alpha emitters often called "alpha wastes". The alpha emitter concentration is considered as significant if it is higher than a concentration limit set by the safety authorities for each storage site.
- Fission products produced by reprocessing, and current vitrified. The glasses this formed have a high specific activity and consequently liberate a considerable amount of heat.

Figure 4: Forecast of Waste Deliveries (m^3)

	1980		1992		1995		2000	
	annual	cumulated	annual	cumulated	annual	cumulated	annual	cumulated
LMA	20 000	20 000	50 000	500 000	65 000	650 000	70 000	900 000
Alpha	270	270	2 000	9 000	3 000	18 000	3 000	35 000
Glasses	0	0	380	380	175	850	190	1 650

It may be noted that while it is important to take account of the criterion of the external irradiation of the packages for the organization of transport and handling during the operating period, this does not play primordial role with respect to this classification related to the choice of the storage method.

It should be stressed that very high activity wastes are distinguished by very small volumes, and that long half-life wastes display very low radioactivity.

Forecasts of waste deliveries to ANDRA for disposal constitute the very sense of any consistent storage policy. An outstanding effort has been made at all levels to improve the reliability and accuracy of medium and long-term forecasts. Obviously, simplifying assumptions have been made. Permanent updating will be necessary as operating experience grows.

Fig. 4 gives the annual and cumulative delivery forecasts corresponding to a few key dates for each of the three waste categories.

From the clientele standpoint, apart from some 10 large clients, ANDRA has more than about 3000 small clients designated by the name of third parties, including hospitals, universities, research laboratories and industry.

6. French Long-Term Industrial Management Policy and Planned Facilities

From the practical and industrial standpoint, after possible waste treatment, the wastes are usually neutralized and then encased in a matrix (cement, bitumen, resins . . .) or vitrified.

and finally packaged in a container for disposal. In actual fact, for many reasons and especially in order to meet transport safety regulations, and facilitate their handling, packaged wastes are presented in the form of highly elaborate packages. They now have to be stored finally.

French disposal policy as many others foreign policies is based on the consideration of four principal factors:

- the advantage of radioactive decay,
- the risk of human intervention or the action of water,
- the duration of the effectiveness of artificial barriers,
- the total cost of waste disposal.

The optimization of these four factors leads to (fig. 5):

- sub-surface storage of short lived wastes or non-alpha wastes, because we have barriers with an effectiveness of at least 300 years, and surveillance of the storage site throughout this period;
- deep storage of long lived wastes or alpha wastes at a suitable depth to shield them from unforeseen human intervention. Hence only the action of water needs to be considered;
- deep storage of vitrified wastes after a prior cooling period on the surface or in situ.

The final storage of low and medium activity wastes, the only wastes whose final storage can be authorized in France for the time being, is carried out by sub-surface storage in accordance with the following basic principle:

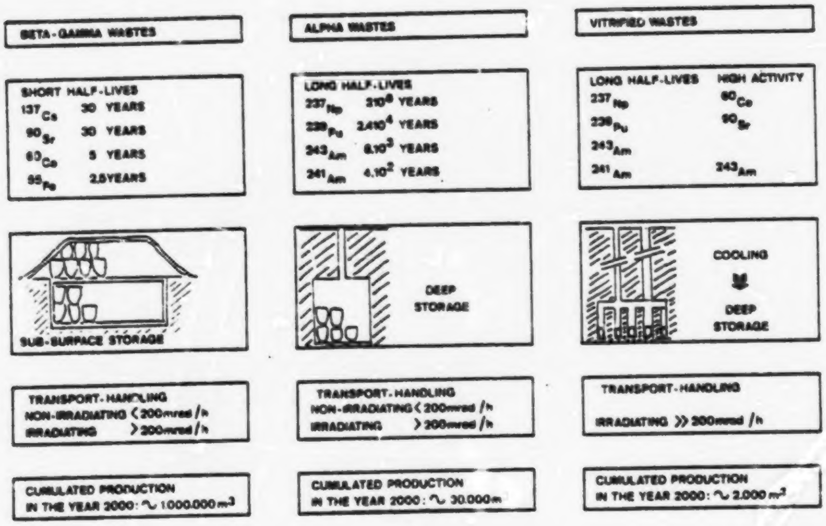
BETA-GAMMA WASTES
ALPHA WASTES
VITRIFIED WASTES
SHORT HALF-LIVES
^{137}Cs 30 YEARS
^{90}Sr 30 YEARS
^{60}Co 5 YEARS
^{55}Fe 2.5 YEARS
LONG HALF-LIVES
^{237}Np 2.10^{6} YEARS
^{239}Pu $2.4.10^{4}$ YEARS
^{243}Am 8.10^{3} YEARS
^{241}Am 4.10^{2} YEARS
LONG HALF-LIVES
^{237}Np
^{238}Pu
^{243}Am
^{241}Am
HIGH ACTIVITY
^{60}Co
^{90}Sr
^{243}Am
SUB-SURFACE STORAGE
DEEP STORAGE
COOLING
DEEP STORAGE
TRANSPORT-HANDLING
NON-IRRADIATING < 200mrad /h
IRRADIATING > 200mrad /h
TRANSPORT-HANDLING
NON-IRRADIATING < 200mrad /h
IRRADIATING > 200mrad /h
TRANSPORT-HANDLING
IRRADIATING >> 200mrad /h
CUMULATED PRODUCTION
IN THE YEAR 2000: ∿ 1000.000 m³
CUMULATED PRODUCTION
IN THE YEAR 2000: ∿ 30.000 m
CUMULATED PRODUCTION
IN THE YEAR 2000: ∿ 2.000 m³

Figure 5: Waste Classification.

The confinement of radioactive materials, and hence their isolation from the present or future human environment, must be guaranteed for a sufficiently long time (200 to 300 years) to give them the time to decay to a level at which the potential risk that can be considered to be negligible.

This serves to distinguish three in the life of such a storage center:

- the *operating* period during which the wastes are installed in place and the insulation structures built. This period may last 10 to 25 years;
- the *surveillance* period after operation, during which no works need to be performed other than possible repair operations, but during which surveillance is provided. The site remains the property of the State and access is restricted. This period may last 200 to 300 years;
- the *unrestricted access period*, during which no surveillance or service is provided, and in which access or enjoyment of the site may be decontrolled. The only remaining risk would be that of the dispersion of long half-life materials, in the event that a limit had not been set for the wastes accepted by such a storage center. This limit must be set in terms of both maximum concentration per unit volume and total activity storable in the center.

From the practical standpoint, in view of progress achieved in waste packaging techniques, and the quality of these packages, it is possible, by special arrangements on the storage center (concrete monolith, sealed cover, water drainage, etc.), to achieve sufficient isolation of the wastes industrially with artificial barriers (fig. 6).

This makes it possible to be less stringent with respect to the intrinsic qualities of a surface storage site, especially since, whatever these may be, no savings could be realized, since their acceptance by public opinion will in any event demand the long-term reliability of artificial confinement.

However, the real characteristics of the site selected are nevertheless determined and taken into account to make sure that:

- during the operating and surveillance phases after operation, the risk level in case of incident remains lower than the maximum level allowed by national and international regulations,
- during the unrestricted access period, potential risk levels remain negligible in any eventuality.

It is on the basis of the foregoing considerations and after having made a thorough safety analysis that the waste acceptability rules are set. Experience hitherto gained shows that the acceptability rules thus determined serve or will serve to accomodate the bulk of the "beta and gamma wastes" of which production can be foreseen in France.

For this purpose, ANDRA has the *Manche Storage Center (CSM)* with an area of about 30 acres, a surface storage capacity of about 300,000 m^3 of low and medium activity wastes, of which about 120,000 m^3 are already occupied. At the growing delivery rate of 20,000 m^3 per year, the CSM will be saturated in 1985–1986, although it would seem wise to reserve the remaining capacity to accommodate wastes from

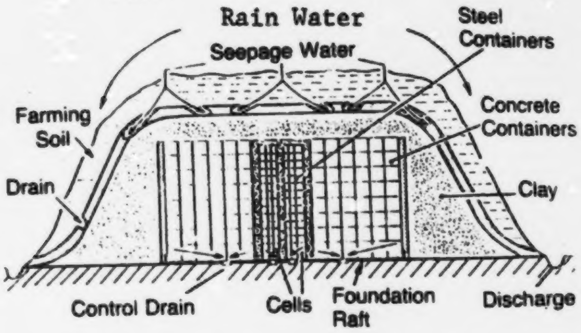
Rain Water
Seepage Water
Steel Containers
Farming Soil
Concrete Containers
Drain
Clay
Control Drain
Cells
Foundation Raft
Discharge

Figure 6: Principle of Storage: Platforms and Drains.

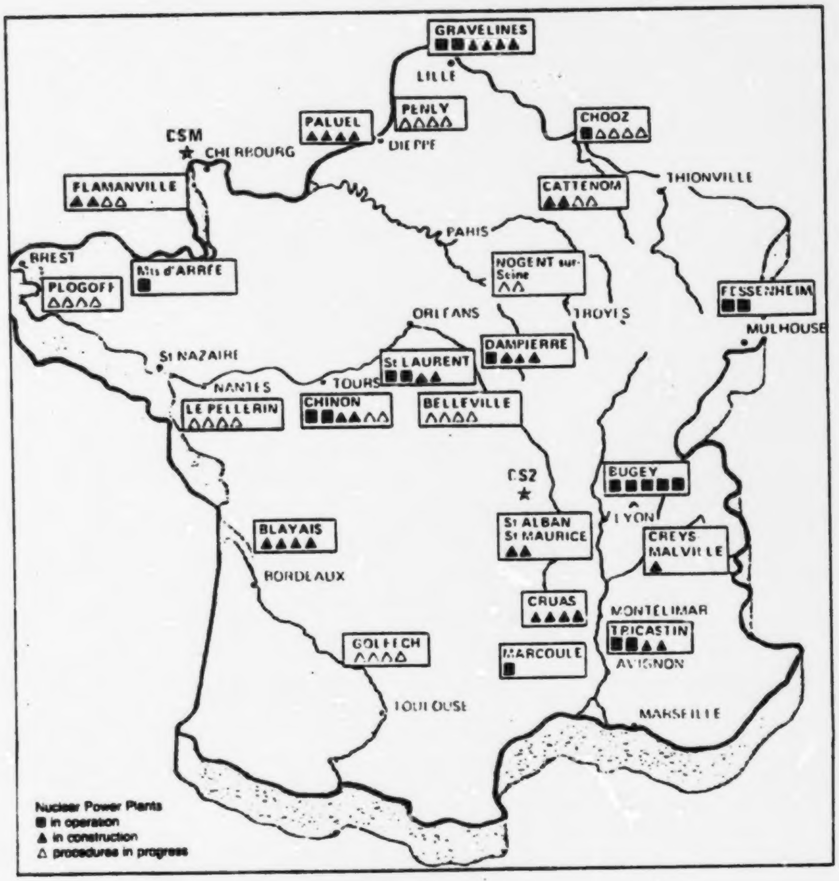
GRAVELINES ■■▲▲▲▲
LILLE
PALUEL ▲▲▲▲
PENLY △△△△
DIEPPE
CHOOZ ■△△△△
CSM
CHERBOURG
FLAMANVILLE ▲▲△△
CATTENOM ▲▲△△
THIONVILLE
PARIS
BREST
Mts d'ARREE ■
PLOGOFF △△△△
NOGENT sur-Seine △△
FESSENHEIM ■■
ORLEANS
TROYES
MULHOUSE
DAMPIERRE ■▲▲▲
St NAZAIRE
St LAURENT ■■▲▲
NANTES
TOURS
LE PELLERIN △△△△
CHINON ■■▲▲△△
BELLEVILLE △△△△
CS2
BUGEY ■■■■■
LYON
St ALBAN St MAURICE ▲▲
BLAYAIS ▲▲▲▲
CREYS MALVILLE ▲
BORDEAUX
CRUAS ▲▲▲▲
MONTELIMAR
TRICASTIN ■■▲▲
GOLFECH △△△△
MARCOULE ■
AVIGNON
TOULOUSE
MARSEILLE
Nuclear Power Plants
■ in operation
▲ in construction
△ procedures in progress

Figure 7: Nuclear Reactors in Operation, under Construction and Planned (September 1, 1980).

the adjacent Cogéma facility and neighbouring nuclear power plants. The creation of a second storage center for low and medium activity wastes, capable of accommodating several hundred thousand cubic meters, is therefore necessary in the very short term, if possible in central for southeastern France (fig. 7).

This is why, simultaneous with the formation of ANDRA, the government decided to establish a second storage center. The *Bois Noirs* site in the Forez region was selected and the plan was made public in autumn 1979. The licensing request for the creation of this center was filed on March 30, 1980. Subject to the granting of this authorization, inauguration is planned for early 1983. The local inquiry, opened on May 19, 1980, was closed without any significant incident on June 13. This center will only accommodate low and medium activity wastes for final storage.

This second storage center will have capacity of a few hundred thousand m^3 of surface storage. Subject to thorough geological and hydrogeological surveys, this capacity could possibly be expanded considerably by the digging of tunnels. If these surveys, which will be carried out in 1981, yield positive conclusions, ANDRA will file a new authorization request.

Alpha wastes, namely those whose long half-life radioelements preclude final surface storage, will be stored at medium depth in France.

The objectives of ANDRA's industrial policy governing alpha waste management are:

- to attempt to build a long-term underground disposal facility, in tunels dug in the second storage center or on another site (CS. 3) ANDRA will implement the investigative means to try to secure the qualification of this alpha center and its industrial commissioning before 1990;
- to organize temporary storage facilities to meet the most pressing needs.

As for ***vitrified wastes***, the solidification solution selected by France and many countries committed to nuclear power, they are temporarily stored on the surface on the production sites. ANDRA is actively investigating the most suitable method of disposal, both from the safety and economic standpoints, in the ideal geological formation and at a suitable depth, on a land site.

This activity per unit volume of the fission products vitrified wastes is very high. Consequently, the heat energy produced by the packages is so high that, in the initial years following their production, it is impossible to bury them without special precautions, because the degradation of these packages and the environment could incur unacceptable risks.

Different solutions have been proposed to solve this problem:

- cool the packages completely on the surface for about 150 years and then bury them so as to consider them as merely cold packages, making it possible to have a compact storage unit,
- cool them partly on the surface, for example for 30 years and bury them. In this case, the residual heat remains high, and a large storage facility must be built, with the packages sufficiently distant from each other to prevent average heating from being prohibitive,

- build a compact geological storage facility a few years after the fabrication of the glasses, cool the packages in situ, and after a sufficient number of years, transform this storage facility into a disposal by sealing it suitably.

These three solutions are currently being investigated by ANDRA, particularly the third, in the following steps:

- feasibility study initially aimed essentially at the analysis of heat problems and at mining problems,
- if this study is conclusive, the creation of a demonstration glass storage facility (SDV) which could be designed to make a full-scale demonstration of a very long-term storage facility.

This SDV, or a surface storage center, should enter service in 1992, when Cogéma will deliver the first glasses to ANDRA (about 400 m^3); the total volume of foreseeable deliveries by the year 2000 will reach a maximum of 2000 m^3.

Simultaneous with the feasibility study, or at least as soon as the study has shown that the hypothesis of cooled storage in situ is not discarded, ANDRA will carry out a census and assessment of a number of sites in France, those which could accommodate the demonstration storage facility when the time comes, and later, the industrial storage facility. This study will naturally be carried out jointly with the prospecting of sites for low heat emission alpha wastes.

7. The Financing of ANDRA's Activities

Like for the disposal of other wastes, the "polluter pay" principle is applied to the financing of ANDRA. This is secured as follows by the waste producers:

- annual operating costs of the storage centers and of ANDRA are directly billed to the organizations that deliver the wastes,
- specific investments, namely those related to the storage of specific wastes, from clearly identified owners, are prepayed by the latter,
- finally, the remaining and most investments, called joint investments, are financed by loans, for which the service is covered annually by the organization that produced the wastes under hand contracts.

As for the long-term burdens, the distribution principle has been selected, similar to the retirement system, in which the young wastes pay for the old wastes, in preference to capitalization. However, a provision to cope with immediate expenditures in case of accident is gradually being installed.

As an order of magnitude, the five year plan, provides for expenditures in the order of 700 MF including 400 MF of capital expenditures over the 1980–1984 period. In exchange for its monopoly, ANDRA guarantees its clients the correspondence of its management, the chief among these clients being members of its executive committee.

8. The Policy of Operating, Engineering and R&D Assistance

The ANDRA's creation act clearly states that ANDRA can not delegate or transfer its liabilities in other words, ANDRA must remain the owner and prime contractor. But, for reasons of flexibility, a lightweight organization was adopted for ANDRA which therefore relies on operating, engineering and research and development assistance.

ANDRA, the owner and prime operator of CSM entrusts under its supervision, the management of the CSM to an operator.

For engineering, ANDRA calls on the services of different industrial consulting engineers.

Furthermore, for the R&D standpoints, ANDRA relies on the operational units of the CEA and on the services of different organizations engaged in this field.

9. Conclusion

I would like to emphasize, after this outline of the frame work of industrial waste management policy in France, that the most important problem met by ANDRA remains the political and social problem. ANDRA is to convince the public that the establishement of these industrial facilities serves and will serve to solve the problem of radiactive waste disposal in condition of safety substantially equivalent to those governing the disposal of all other waste.

CSO: 5100/2317

BRIEFS

EIGHT FAST SHUTDOWNS IN QUARTER--Nuclear plants in Sweden experienced eight fast shutdowns during the first quarter of this year. This appears from the quarterly report of the Nuclear Inspection Agency (SKI). The period was characterized by a normal operation for most of the units, said SKI. Five of the fast shutdowns hit Forsmark 1. Three of these were caused by problems in the turbine parts. Ringhals 1 ran best. It was in operation the entire period without any problems or fast shutdowns. The plant has thereby set a record: Ringhals 1 delivered electricity to the power network for 174 days in a row. [Stockholm SVENSKA DAGBLADET in Swedish 18 Aug 81 p 7]

CSO: 5100/2320

END

JPRS 79024

21 September 1981

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 115

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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JPRS 79024

21 September 1981

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 115

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FINLAND SENDS NUCLEAR WASTE FROM LOVIISA PLANT TO USSR

Helsinki HELSINGIN SANOMAT in Finnish 16 Aug 81 p 23, 19 Aug 81 p 8

[Article by Risto Valkeapaa: "Nuclear Waste to be Transported Secretly Across the Border"]

[Text] Finland's most closely guarded secret is the moment when the nuclear waste from the Loviisa Nuclear Power Plant will leave the island of Hastholmen on its return trip to the Soviet Union.

A year has been spent in the preparation of this first return trip or shipment of used nuclear fuel. Recently almost any day has been predicted as the departure date, even this Sunday morning.

The risk studies and theoretical calculations concerning the possibility of an accident have been completed. The transport equipment has been put in order and tested for several weeks. The transport route from Loviisa to Vainikkala has been tested and rescue plans have been prepared along the route. Fire chiefs along the route in residential areas will be on their toes when this first special shipment passes by.

The train that will transport the nuclear waste will travel a slow 15 kilometers per hour through Loviisa, Lahti, Kouvola, and Lappeenranta. The preparations have been thorough and unprecedented, but nearly one-fourth of Finland and hundreds of thousands of people will be made subject to risk.

The shipment is considered to be so safe and will move in the vicinity of so few people that there is no desire to let the public know of it according to Imatra Power. It is expected that the whole shipment will be handled with very little attention brought to it.

The most important reason for the top secrecy of this matter is, however, the fact that nothing or no one should cause any problems or delays while 14 tons of spent nuclear fuel are transported by highway and rail from the island of Hastholmen to Viipuri [Vyborg].

Departure Only in Need of Permission

The transport containers for transporting the nuclear waste along the highway will be brought from the island of Hastholmen to the train station in Loviisa where the containers will be transferred to a special Soviet train. The remainder of the trip will be by rail.

The special train for transporting the fuel arrived in Loviisa at the end of July. Upon arrival defects were found in the transport containers in the water pipes along the bottom or in the welded joints connecting the bottom plugs. Atomenergoexport [All-Union Institute for the Export of Nuclear Energy] fixed the defects in the bottom plugs and the containers were declared to be safe for loading with fuel rod clusters at the power plant. Defects were also found this week in the carriages of the transport trucks. On Thursday Imatra Power reported that their repair will take several days. After the repair, loading, and examination of the containers the only thing that remains to be done is to obtain permission from the Radiation Safety Institute.

The first "sweaty" shipment from Loviisa's Hastholmen Island to the train station in Loviisa, where the special Soviet train is located, will be taken care of by special drivers Keijo Pyyhtia and Hannu Karvinen. The length of the trip is approximately 16 kilometers.

The transport equipment is comprised of two heavy-duty, English-made, 370-horse power trucks normally used for transporting electric transformers. Transfer carriages, onto to which the nuclear waste containers will be lifted, will to attached to the back of them.

Pyyhtia's and Karvinen's job is to drive the containers one at a time from Hastholmen to the railroad yard located in the center of Loviisa.

This special shipment of nuclear waste will be no different than any other cargo for these professional drivers. They say that they understand very well the importance of this shipment. "The concern of others has not, however, increased the pressure," argues Keijo Pyyhtia, 38 and a bachelor.

But it is certain that even these professional drivers will feel better after the load has been safely delivered to the railroad yard in Loviisa.

Risk of Accident Calculated to be Small

Preparations for the transfer of this nuclear waste have been going on for a long time already. Imatra Power had the State Technical Research Institute conduct a risk study in 1979. It was accomplished according to the requirements.

In this risk study the average person is concerned by the information that in the worst possible case an individual can receive a radiation dosage of 1.6 rem if he remains in the vicinity of the accident for 10 days. According to the law and security stipulations the highest allowable annual dosage for a worker is 5 rem at this time.

In the summary of the risk study it was confirmed that the theoretical possibility of an accident is one in 500,000 years if two shipments are made every year. Statistics on accidents served as the basis of this theoretical calculation.

Railroad grade crossings, of which there are several between Loviisa and Viipuri, are considered to be the worst spots during the transporting of the nuclear fuel.

All in all, the risk study evaluated the risks to be quite small. In evaluating risks it must also be taken into consideration that special care must be taken in making preparations for the shipment. The State Railroads arranged an undisturbed schedule for the shipment, among other things.

An Atomic Age Train on an Age Old Route

However, the State Railroads has not won everyone's endearment. The city of Loviisa has sharply criticized the condition of the railroad track between Loviisa and Lahti. This section of the track is the weakest link in this shipment. This atomic age cargo will be carried on rail laid in the 1920's. The 15-ton axle weight of the special train carrying the spent fuel is approaching the 17-ton weight limit of the track.

"What if the load ends up in the ditch between Loviisa and Lahti?" is the question of Chairman Martti-Ragnar Nordstrom of the Loviisa Port Authority and city fathers to the State Railroads:

"Since the track must be repaired sometime, why not repair it now since its condition is especially significant to this shipment and the country?"

"The State Railroads assures us that the track will hold up. In any case the special train will travel the route at a very slow speed. Its speed will be only 15 kilometers per hour.

This special shipment has now forced even the railroad administration "to see" the poor condition of old tracks, such as the Loviisa track.

The State Railroads has become aware of the poor condition in which their tracks are. They should be repaired as soon as possible," states State Railroads Director Herbert Romer.

According to Romer the track between Loviisa and Lahti is not in any way in an exceptional position as far as little used older tracks are concerned. Its conditon will also be improved only when railroad tracks are to be repaired at a more rapid rate throughout the whole country.

Defects in Containers Accidentally Made Public

The individual who did a poor job of welding the water pipes and the bottom plugs of the transport containers also did not win anyone's praise.

Atomenergoexport has now repaired the defects observed in the examination conducted by the Finns. Imatra Power can now report that there are no defects in the containers. This is what it has said all along.

However, the defects were "accidentally" made public when the bottom of one of the containers was covered with plastic at the railroad station in Loviisa. The plastic was taped up to protect two fist-sized radiating spots. The nuclear power people were talking about surface contamination.

Since radiation fuel is normally inside the container, one can assume that any surface contamination is from within the container. The bottom plug of the container with the protective covering had simply leaked and active water had dripped onto the outer surface.

At the Radiation Safety Institute the leaking of the bottom plug is considered to be the probable explanation for the activity appearing on the bottom surface of the container.

Otherwise the containers have met Finnish requirements rather well. Ultrasonic measurements and inspections did not reveal anything significant.

Containers to be Sealed

Precise security measures will be applied with respect to nearly all of the operations connected with the return of the fuel. The Radiation Safety Institute will supervise the operation from the beginning to the end. Also the transport containers will require the approval of the Radiation Safety Institute.

The fuel rod clusters will be transferred within the nuclear power plant to the supervision of the Radiation Safety Institute. The clusters will be transferred to the transport containers in tanks under water in the storage area for used fuel.

Before the lid of the transport container is bolted shut a representative of the Radiation Safety Institute will inspect the characteristics and the quantity of the clusters. The bolted lid will be sealed.

"When the fuel rod clusters are from all respects ready in the container, the water will be drained from the container and will be replaced with nitrogen," states Antero Tamminen, chief of the Loviisa Plant's technical group.

The fuel that will now be transferred was taken from the Loviisa I reactor 3 years ago. It continues to produce enough heat for a small sauna and raises the temperature of the nitrogen surrounding it to more than 100 degrees.

The filled container will be allowed to equalize itself before it is transported. During shipment the pressure will be nearly the same as that of a hard motor vehicle tire, or approximately 2 baria.

If one were to touch the surface of the filled container, one's fingers would not be burned. The temperature of the outer surface is approximately 40 degrees, and the cooling ridges on the surface of the container facilitate heat transfer.

According to the Radiation Safety Institute it is not dangerous to be near the filled containers.

Side Streets to the Railroad Yard

The commencement of the shipment will mean that traffic will have to be regulated on the main roads. The distance from the plant to the railroad yard is approximately 16 kilometers.

The traffic dividers along the route from Hastholmen to Loviisa station have from the very beginning been made so that they can be moved. The only thing that needs to be done at the crossing of highway 7 and the road coming from the power plant is to carry the concrete markers out of the path of the trucks carrying the nuclear waste.

The cargo will travel along the highway at approximately 20 kilometers per hour under strict supervision. In addition to the drivers, there will be approximately five individuals in the truck engaged in supervision work. The shipment will also be accompanied by a convoy of several individuals.

In the center of Loviisa the cargo of nuclear waste will travel through town along Mannerheim Street. Before it reaches the railroad yard it will also have to follow side streets. The route has been tested previously so that there should be no surprises.

The approximately 4-meter high and 83-ton containers will be transferred to a special train with a 200-ton crane, which has been used in connection with other large shipments for Imatra Power.

In addition to the poor condition of the railroad track between Loviisa and Lahti, the more significant points along the railroad track are in the center of Lahti where an accident would cause the most extensive radiation effects on the population. In practice the most extensive rescue plans are needed in Lahti.

Another Shipment Next Year

The shipment will travel 16 meters above the surface of Kymi River on the Koria Bridge at Elimaki. The container has been designed to resist a possible drop into water even from this height. In tests corresponding models of containers have been dropped 15 meters on to hard ground.

According to the norms the container should withstand a drop of 9 meters on to hard ground. It should stay airtight for 8 hours in water at a depth of 15 meters. In fire the container should last 30 minutes in a temperature of 800 degrees Celcius.

Kouvola is also a significant point along the transportation route. The undisturbed schedule arranged by the State Railroads at this junction will come to a test.

According to the nuclear waste agreement the Finns will transport the nuclear waste all the way to Viipuri where it will be turned over to Soviet authorities.

This first shipment of spent nuclear fuel will be a demanding and complex operation for the Finns. Real problems caused by nuclear waste will not begin until after Viipuri. The Soviets must resolve the final disposition of spent fuel which will remain active for tens of thousands of years.

The next shipment of used nuclear fuel from Finland to the Soviet Union will be made next year. There will be no shipments of waste in the next 2 years. The pause is a result of the fact that the spent fuel from the reactors in 1980 and after that must cool off for 5 years in Loviisa. Beginning in 1985, 28 tons of spent fuel will be transferred from Loviisa to the Soviet Union annually.

[19 Aug 81 p 8]

Nuclear Waste Was Loaded During the Night

The atomic train loaded with spent fuel from the Loviisa I Nuclear Power Plant began its journey from Loviisa station to Viipuri on Tuesday evening just a little before 7:00 o'clock. From Loviisa to Lahti the train will travel at a speed of 15 kilometers per hour since the track on this section is in poor condition and the axle weight of the train is close to the weight limit of the track.

The first shipment of nuclear waste to the Soviet Union will travel from Loviisa to Viipuri via Lahti, Kouvola, and Vainikkala. The train will reach Vainikkala early Wednesday morning.

Rescue plans were made in advance along the route in the event of a possible accident.

All four nuclear waste containers were transferred one at a time from the atomic island of Hastholmen to Loviisa railroad station during the night between Monday evening and Tuesday morning.

The transporting of the nuclear waste along the highway took place without incident, and no dangerous situations occurred even in the center of Loviisa where the final route left Mannerheim Street to wind along side streets. The police kept the route secure along the way.

Time of Departure Kept a Secret

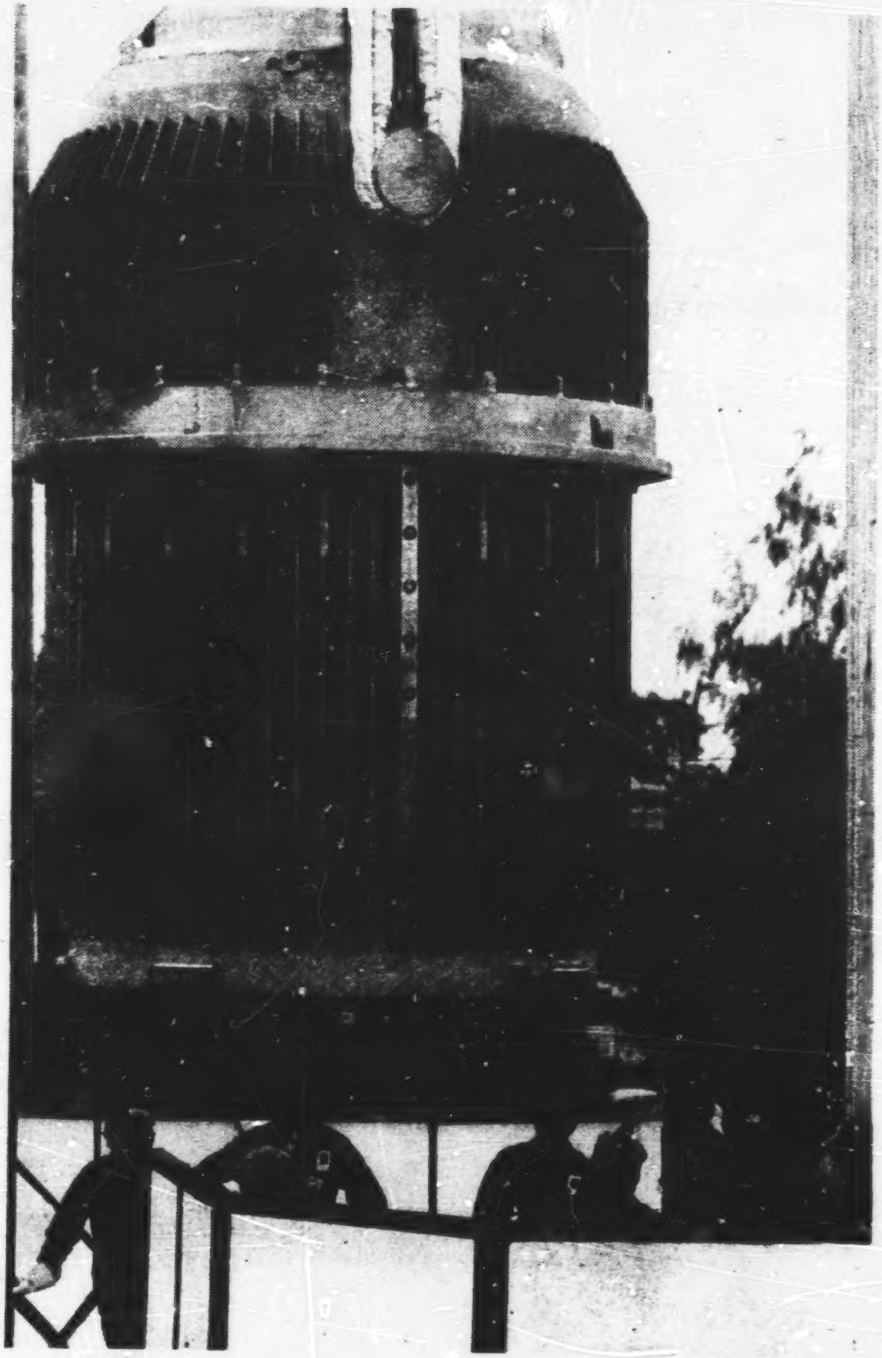
Imatra Power kept the departure time of the nuclear train as well as the transport along the highway secret until the last minute. Police Inspector Ruben Hindsberg states that Loviisa police, who participated in the transporting of the nuclear waste along the highway, learned about their duties only a few hours before.

The postponement of information concerning the operation to the police caused difficulties in the compiling of work lists, among other things.

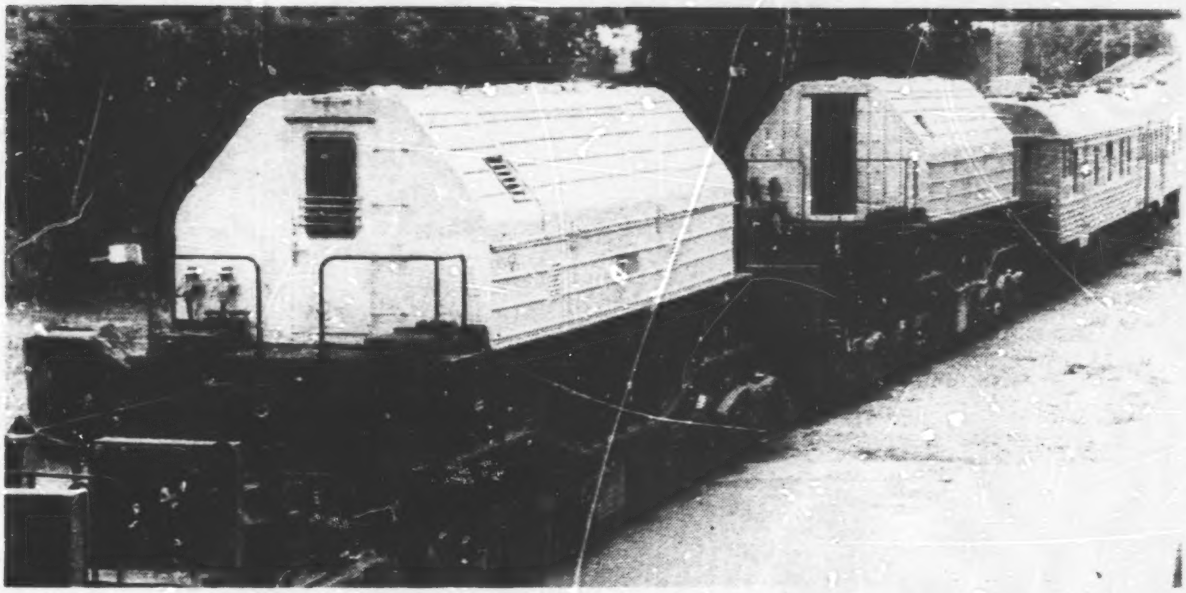
The transporting of nuclear waste through the center of Loviisa did not provoke the anger of residents, but it also did not cause any joy. During the transporting of the first container the following comment was heard on the sreet corner: "It's a good thing we are getting rid of this mess," depicts the feelings of the city's residents.

The administrators of the Loviisa Power Plant and the Radiation Safety Institute accompanied the transporting of the nuclear waste along the highway. The various stages of the operation will be thoroughly examined later so that subsequent shipments will go more smoothly.

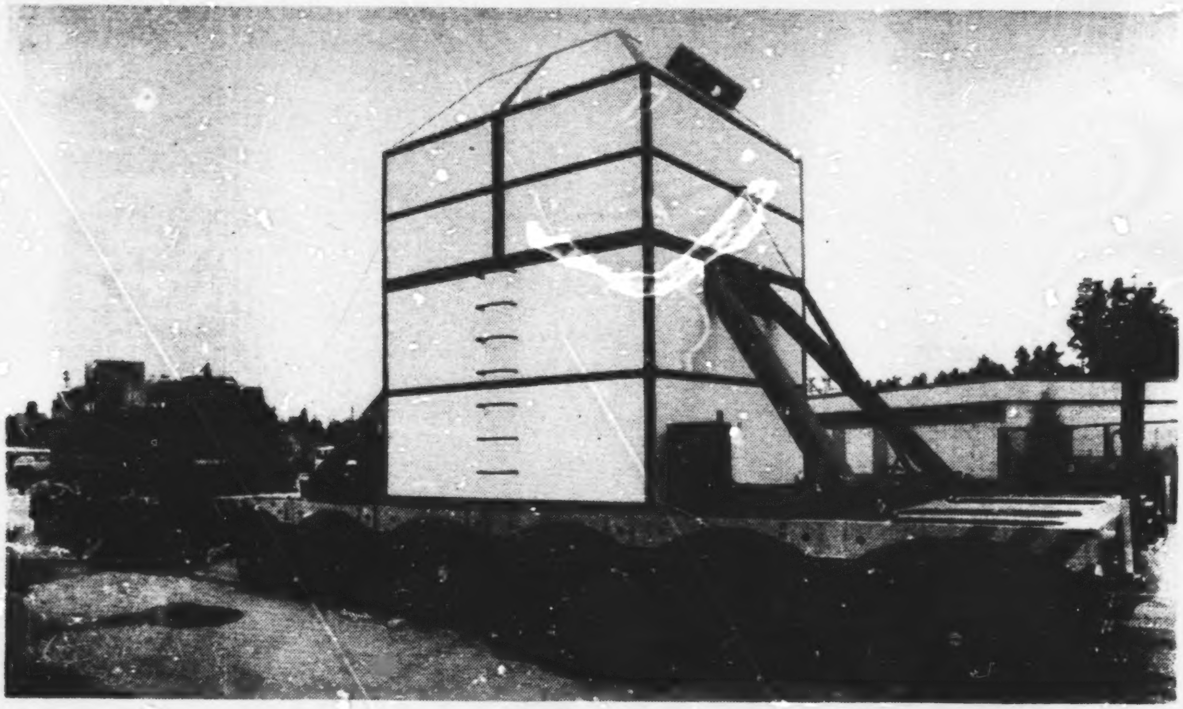
A total of 14 tons of spent nuclear fuel, which has been stored at the Loviisa Power Plant for 3 years, will now be returned to the Soviet Union. The next shipment of spent nuclear fuel will be sent from Finland to the Soviet Union next year.



The transport container is 4 meters high and weighs 83 tons when full. In the risk study its weakest point was determined to be the lid fastener. The lid was bolted shut.



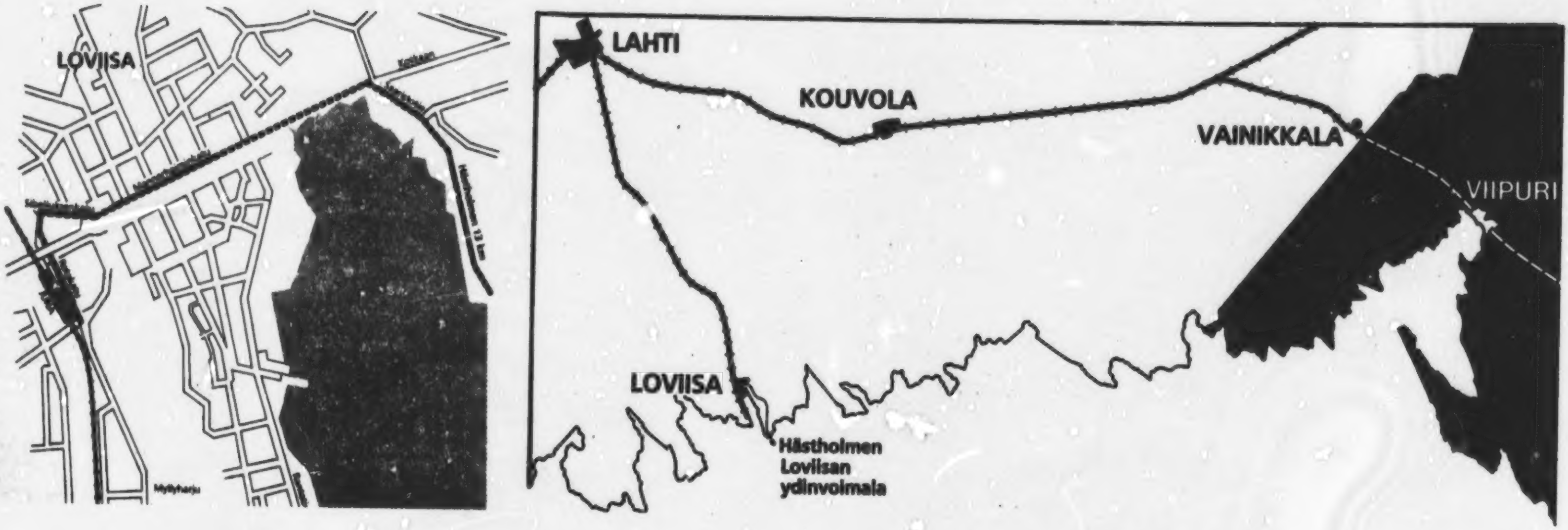
The special Soviet train has been reserved for a period of 1 month for the Loviisa shipments. In addition to the Soviet Union the same type of transport equipment is used in the GDR and Bulgaria.



On the highway the container travels inside a metal plated box. The primary purpose of the box is to protect the container from tipping over and from dust.

ERIKOIS-
KULJETUS

Special driver Keijo Pyyhtia will drive the container to the Loviisa railroad yard.


LOVIISA
Hästholmen 13 km
LAHTI
KOUVOLA
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VIIPURI
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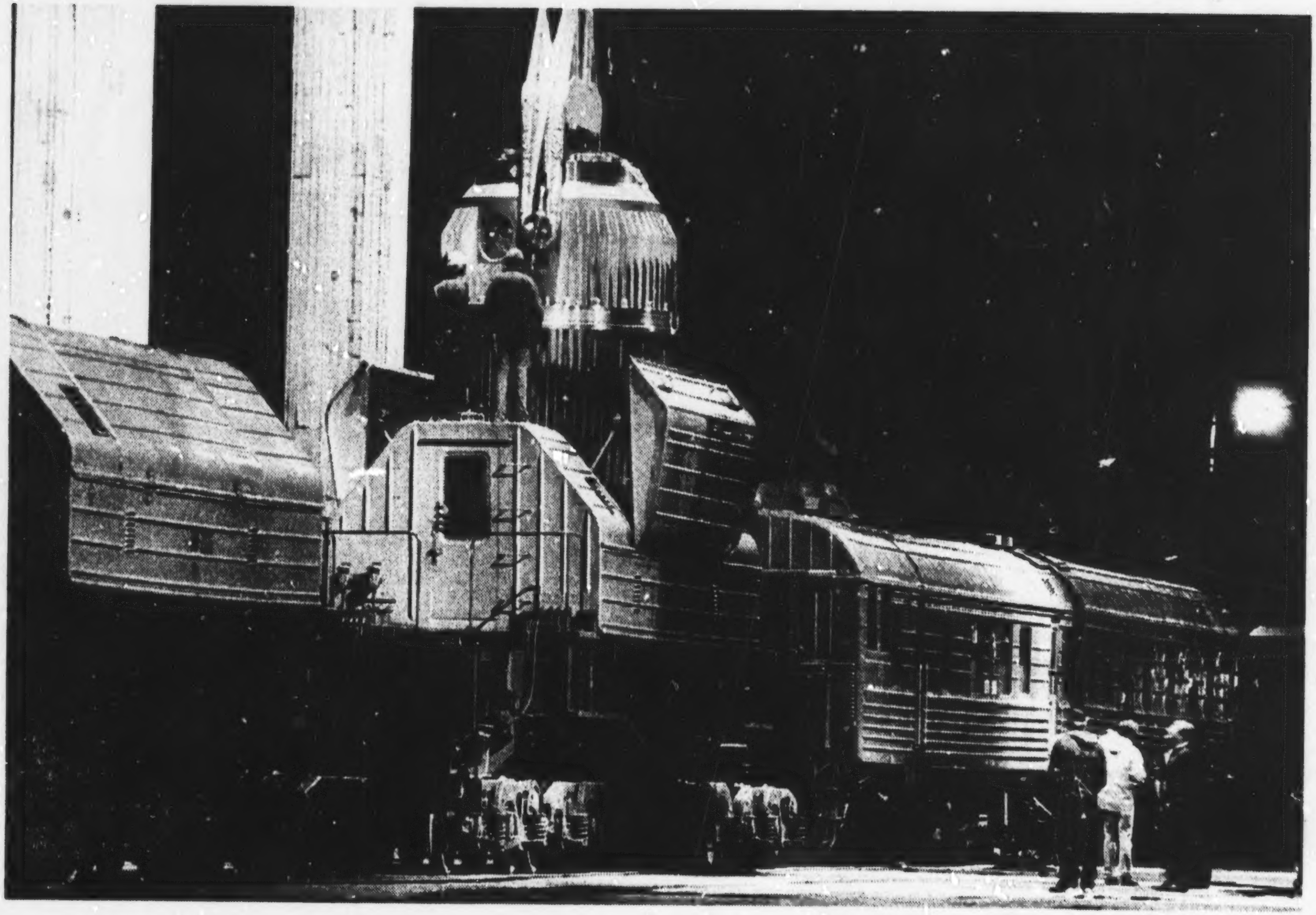
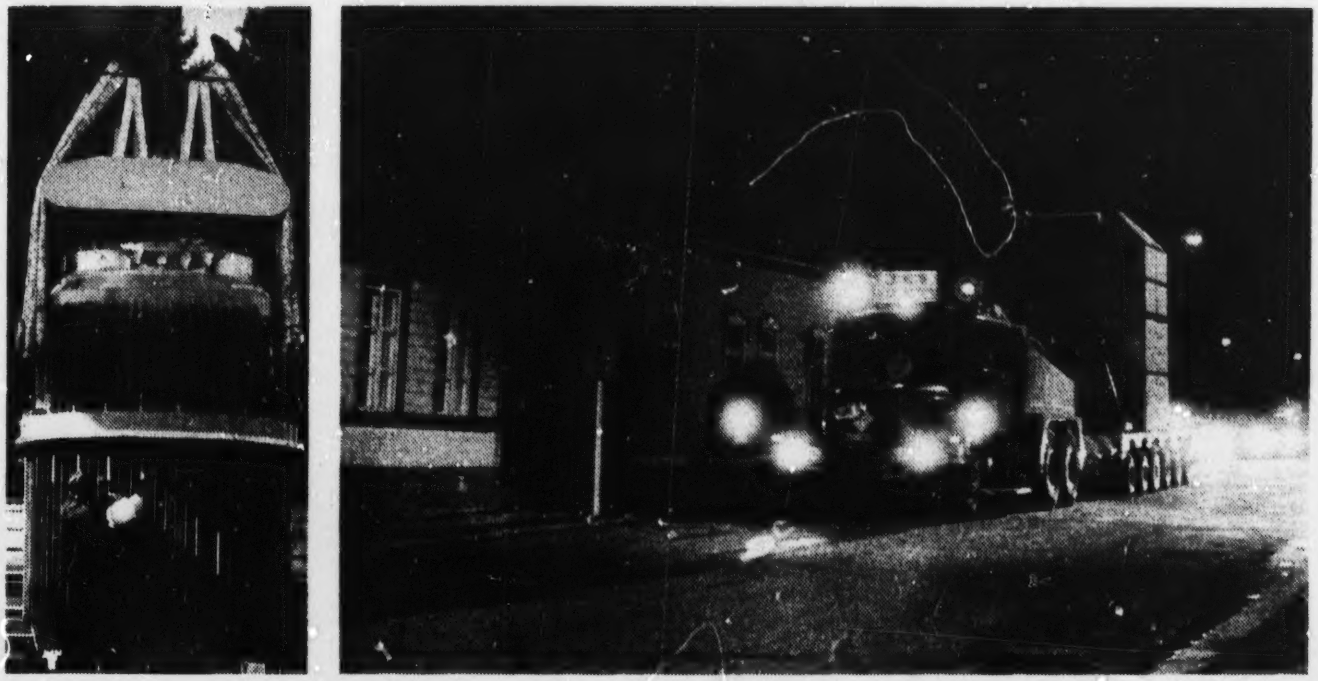
The nuclear waste will be transported by truck from Hastholmen to the Loviisa railroad yard from where the journey will continue to Viipuri via Lahti, Kouvola, and Vanikkala.



The 83-ton containers of waste fuel were loaded on to Soviet railroad cars by Imatra Power's crane at Loviisa station.



Radioactivity was examined the whole time. The nuclear waste convoy travelled along quiet and empty streets. The transporting and loading lasted until Tuesday evening.

10576
CSO: 5100/2316

BRAZIL

NUCLEAR PROGRAM COSTS TO HIT 117 BILLION CRUZEIROS BY END OF YEAR

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 16 Aug 81 p 53

[Text] Rio--The costs of the Brazilian nuclear program will reach 117 billion cruzeiros by the end of the year but despite the enormous outlay, the Angra-I plant will not go into commercial operation until 1982; Angra-II is still in the foundation stage; the Angra-III project is at a standstill and research work is "moving very slowly," according to the scientists.

A considerable part of those funds (88.3 percent) belongs to the Brazilian Nuclear Corporation (NUCLEBRAS), which has 107 billion cruzeiros, 81.42 billion of which are intended for capital expenditures. Of those expenditures, 75.83 billion cruzeiros will be spent on investments. In the area of current expenditures, the bulk pertain to financing charges which will consume no less than 8.38 billion cruzeiros to pay off obligations, especially for foreign loans.

Next month, the German firm KWU will be delivering equipment to NUCLEBRAS which was to have been installed this year in the buildings of the Angra-II plant. Since those buildings have not been built, inasmuch as the heading slab had not even been begun, the equipment will remain idle and possibly stored in the port of Hamburg, Germany, at a high cost for safekeeping and insurance. Nuclear sector experts revealed that the equipment, to be paid for this year, cost 25 billion cruzeiros. The president of the company, Ambassador Paulo Nogueira Batista, denied that that was the cost of the equipment but did not clarify what it was.

Investments

With regard to its investments, NUCLEBRAS explained that in 1981 it is spending a total of 46 billion cruzeiros, most of it (it did not reveal how much) on the civil works of Angra-II and Angra-III. According to that company also, 23 billion are being spent on the fuel cycle--exploration and prospecting of uranium--and the Pocos de Caldas and Rezende plants. The remainder of its budget appropriation (107 billion cruzeiros) was distributed among its subsidiaries.

The sources of NUCLEBRAS' funds are not a secret, according to the company itself. Its main receipts (56.8 billion cruzeiros) come from foreign and domestic credit transactions, as follows: external, in service goods, 34.56 billion cruzeiros; external, in currency, 17.82 billion cruzeiros; domestic, in service goods, 4.42 billion cruzeiros. The national participation in credit transactions to obtain service goods was only 21.9 percent compared to foreign transactions. The second largest source of funds for NUCLEBRAS was the treasury (30 billion cruzeiros) in the form of new supplementary appropriations, because only 2.15 billion cruzeiros were allocated in the form of ordinary funds.

During 1981, Furnas has spent 30 billion cruzeiros on Angra-I but the plant will not be inaugurated until 1982 although the president of the company, Licinio Seabra has announced that the charging of the reactor nucleus for the so-called "critical state" tests will take place next October, the most important tests for the operation of the plant. The plant will go into operation 5 years late and at quadruple the cost, inasmuch as it was originally estimated at $320 million and it will be completed at a final cost of $1.4 billion (140 billion cruzeiros).

Sector experts admit that to continue the nuclear program in 1982 according to the terms in which it is drafted (maintaining the timetables), it will be necessary to at least double the 1981 funds. As for the results of those aspirations, they say, only "God and Delfim" know.

8711
CSO: 5100/2311

ANGRA-I TO BEGIN OPERATION IN MID-SEPTEMBER

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 7 Aug 81 p 28

[Text] Rio--The previous problems having been resolved and first phase tests having been completed, the Angra-I nuclear plant will begin operations in mid-September, when the nucleus of its reactor will receive the 50 tons of enriched uranium comprising the first charge. The unit will not go into commercial operation until the first quarter of 1982, when the second phase of the tests (critical state) is completed.

That information was provided yesterday in Rio by Furnas president, Engineer Licinio Seabra, who explained that the fuel will be placed in the nucleus during that period of time but that does not mean a set date because any difficulty arising between now and then could result in an immediate change.

The last date given for charging the Angra-I reactor, which is going to operate with a power of 626,000 kilowatts, was last 14 July, according to the announcement of Furnas and National Nuclear Energy Commission (CNEN) experts. Experts from Westinghouse (suppliers of the plant) the International Atomic Energy Agency (IAEA) and the CNEN are still following the final tests of Angra-I.

Angra-II and III

Licinio Seabra revealed that up to December 1980, Furnas spent $500 million (50 billion cruzeiros) on Angra-II and III, an amount that will be reimbursed by funds from the National Treasury. Licinio Seabra also explained that Furnas obtained foreign loans in the amount of $150 million (15 billion cruzeiros) for the two nuclear plants, having utilized only 15 percent of that amount (2.25 billion cruzeiros) and transferring the credit balance to the NUCLEBRAS Nuclear Plant Construction Corporation (NUCON). The credit balance of those funds were passed along to NUCON and the 2.25 billion cruzeiros spent will be computed in the overall price of the two plants when they are ready.

With regard to the 26 secret appendices to the overall contracting contract signed on 31 July between NUCON and Furnas, when the Angra-II and III projects were transferred, Licinio Seabra said that they are commercial contracts and other documents kept secret by agreement of the interested parties. He pointed out that among those papers are designs, plans, and agreements on the supplying of technology, services and equipment by Kraftwerk Union AG (KWU), which cannot be made general knowledge but must be restricted to a limited number of people.

Speaking of the company he heads, Licinio Seabra said that Furnas is going to close 1981 with a program in the order of 65 billion cruzeiros, 40 billion of which will be spent on transmission lines, considered a high priority project for the present. For 1982, Licinio hopes to obtain slightly more than 100 billion cruzeiros for Furnas' budget, 80 billion of which will be for transmission lines. He justified the high expenditure on those lines with the explanation that next year that work will reach its level in the southeast to keep up with the progress of the work on the Itaipu hydroelectric plant, which will have an essential role in supplying energy for that region.

8711
5100/2311

CALS SEES URANIUM CONCENTRATE EXPORTS IN MID-1990

Rio de Janeiro O GLOBO in Portuguese 8 Aug 81 p 17

[Text] Brazil may be selling uranium concentrate in mid-1990 if one of the eight nuclear plants called for in the Brazilian-German agreement is installed in the Itataia region in Ceara, Mines and Energy Minister Cesar Cals said yesterday. He said that the installation of a plant in Ceara is an idea that has everything favoring implementation because of its strategic location near the large uranium deposits and other raw materials necessary for concentrate technology.

Cals revealed that he has already been consulted by several countries regarding the possibility of Brazil supplying uranium beginning in the next decade, when a world sgortage of that fuel is expected. On that and other bases, a plant in Ceara territory becomes very viable, he stressed.

Reserves

Making penciled calculations, the minister revealed that the reserves in Ceara can produce 3,000 tons of uranium concentrate per year and 400,000 tons of phosphates. There is a large quantity of gypsum in that region, a material that supplies the sulphuric acid used in the manufacture of concentrate. The phosphate (which appears in association with the uranium) would be exploited by the PETROBRAS Fertilizer Corporation (PETROFERTIL), a subsidiary of the Brazilian Petroleum Corporation (PETROBRAS) together with private companies.

Trip to Nairobi

The minister said that in Nairobi, Kenya, for which he would be leaving a few hours later, he will give a report on the Brazilian energy model during the UN World Conference on New and Renewable Sources of Energy. "We will make a profession of faith that all developing countries will have a way out in the world energy crisis provided they promote bilateral agreements on regional terms to utilize their own resources," he declared.

The minister will say that the Brazilian experience may stimulate similar programs in Third World countries and in that case Brazil is in an appropriate position to sell technology.

8711
CSO: 5100/2311

BRIEFS

BAHIA URANIUM SURVEY--The broadest geologic survey of its kind, covering an area of 1,150 square kilometers will be conducted around the second largest uranium deposit in the country (48,000 tons) in the town of Lagoa Real, municipality of Caitite, Bahia. The broadness of the survey is due to two factors: the uranium in the region is pure (uraninite) and there are possibilities of finding large reserves. That information was revealed in Rio yesterday by nuclear area experts, who added that an agreement will be signed between the Brazilian Nuclear Corporation (NUCLEBRAS) and the Bahia Mineral Exploration Company on the 17th of this month to conduct the survey, at a cost of 120 million cruzeiros and lasting 21 months. In Brasilia, the president of the Brazilian Electric Power Corporation (ELETROBRAS) and the Itaipu Binational, General Costa Cavalcanti, said yesterday that he is unaware of any action or study by the drafters of the so-called "Plan 2000" for the installation of a nuclear plant in the state of Ceara, terming that possibility "Cesar's Business," (referring to Minister of Mines and Energy Minister Cesar Cals). He added that the document, covering projects up to 1985, will be released by the end of October. [Sao Paulo O ESTADO DE SAO PAULO in Portguese 12 Aug 81 p 24] 8711

CSO: 5100/2311

ECUADOR

BRIEFS

NUCLEAR REACTOR PROGRAM--The Ecuadorean Atomic Energy Commission has revealed that work advances on the building and operating of a nuclear reactor, in a program that will greatly benefit the country's productive sector. The reactor will be installed in the southwestern region of Pichincha Province at a site called Aychapico, 2 km from Aloag. The program receives technical cooperation from Spain and will cost 225 million sucres. The reactor's main task will be to convert radioisotopes that will be used, under technical specifications, in Ecuador's main production areas. [Text] [PA140055 Quito Diplomatic Information Service in Spanish 0640 GMT 8 Aug 81]

CSO: 5100/2321

JAPAN TO ASSIST IN URANIUM EXPLOITATION PROJECT

AB101201 Paris AFP in French 0921 GMT 10 Sep 81

[Text] Niamey, 10 Sep (AFP)--A Japanese company, the Power Reactor and Nuclear Fuel Development Corporation (PNC), on Wednesday signed a protocol agreement in Niamey with the Niger Mineral Research Office (ONAREM) for the prospecting and exploitation of a new uranium deposit, it was learned from official sources in Niamey this morning.

The ONAREM-PNC association will soon begin prospecting operations in the department of Agadez--northern Sahara--at in-Adrar. The protocol accord was signed for Niger by Minister of Mines Annou Mahamane and Sani Koutoumbi, the director of ONAREM. Mikio Isetani, the PNC director, signed for his company.

According to the agreement, Japan is to finance the prospecting operations as well as the cost of installations valued at 400 million CFA francs--F9 million--for the first year; 500 million CFA francs for the following 2 years; and 600 million CFA francs for the fourth year.

Japan is already actively engaged in the propsecting and exploitation of uranium in Niger through the Overseas Uranium Resources Development Company which controls 25 percent of the capital of the Akouta Mining Company (COMINAK) one of the two big uranium exploitation companies in Niger. The other is the Air Region Mining Company (SOMAIR). Since the beginning of the year, Japan has bought 816.6 tons of uranium from Niger.

CSO: 5100/4962

BRIEFS

URANIUM PROSPECTING EXPENDITURES--AGIP Spa will spend about K15 million in uranium prospecting in Southern and North-Western provinces during the 1980-84 period. Agip Spa Zambia branch manager Dr Gian Paolo Barzon said this in Lusaka when he commented on progress made by his company in uranium prospecting in the two provinces. Dr Barzon said by 1984 when the prospecting work was expected to be completed, Agip will have spent K15 million in prospecting operations that include drilling and geological survey. The company started its drilling programme in the Gwembe valley in 1979. The drilling operations though costly undertakings were still going on. Dr Barzon said his company's operations in the Gwembe valley had been reduced because of the security situation in the area. "We hope to intensify our operations in Southern Province when the authorities will tell us that it is safe to work in other areas covered in our licence but which we consider unsafe at the moment." Drilling operations which started in Solwezi last year were said to be satisfactory. Dr Barzon said 40,000 metres were drilled last year and a further 20,000 metres were expected to be drilled by the end of this year.[Text] [Lusaka TIMES OF ZAMBIA in English 31 Aug 81 p 4]

CSO: 5100/4961

NEW URANIUM DEPOSIT NEAR LIMOGES BEING EXPLOITED

Paris LE FIGARO in French 21 Aug 81 p 7

[Text] A new uranium deposit beneath the site of La Crouzille (Haute-Vienne), north of Limoges, will soon be put into exploitation. "There is no contradiction with the decisions of the Council of Ministers on 30 July not to grant new mining rights," says a source close to the Energy Ministry. "The request to open was filed by the General Nuclear Materials Company (COGEMA) on 2 July 1980 and the prefect gave his agreement in February 1981." As a matter of fact, for 30 years COGEMA has had in La Crouzille, north of Limoges, a huge concession from which it was extracting uranium. So it did not have to request an exploitation permit or mining rights, simply permission to "open mining work."

The deposit in question, which is several km from the underground Margnac Mine, would be capable of supplying about 500 tons of uranium metal. It extends, open-face, over about 60 hectares of moors and swampy prairies.

On Wednesday about 100 antinuclear demonstrators met in front of the SNCF [French National Railroad] terminal at Equeurdreville, near Cherbourg (Manche) to protest the arrival by rail of irradiated fuel destined for the processing center at the Hague.

Yesterday, section 1 of the Fessenheim (Haut-Rhin) Nuclear Power Plant, which was closed early in June to renew the fuel, was coupled to the EDF [French Electric Power Company] system. The Diesel group connected to the section, which had been damaged by an accidental fire, was replaced by a mobile gas turbine. But this turbine will remain in place only until the Diesel group is permanently repaired, which is scheduled for the end of September. Section 2 of Fessenheim will be closed as scheduled on 29 August to refuel the reactor.

FO [Workers Force] has declared itself in favor of a nuclear map which would give priority to the idea of security over profitability. A delegation from the power plant was received by the minister of Energy. Concerning security, a communication was presented to the International Conference on Structural Engineering Applied to Reactor Technology; the cracks that appeared nearly two years ago on some French nuclear power plant parts will not present any danger until about 50 years from now, at a very pessimistic estimate, actually until a century or two from now, or well beyond the lifespan of these installations.

8946
CSO: 5100/2314 END

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24 September 1981

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 116

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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24 September 1981

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 116

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BRIEFS

JAPAN ASSURES PHILIPPINES ON WASTE--Manila, 7 Sep (AFP)--Japan has assured the Philippines that plans to conduct experimental sea disposal of radioactive wastes would be done only after consultations with the Philippines and other Asian countries, the Philippine Foreign Ministry said today. The Philippines had inquired into Japan's nuclear waste plans after a Flipino opposition assemblyman aired concern over its possible environmental effects here. According to the Foreign Ministry here, the Japanese cabled (?in) reply to their inquiry saying that Japan's decision to dump nuclear wastes into the Pacific Ocean was "not yet definite." Japanese officials said it was their policy to consult nearby countries before implementing any plan dealing with experimental ocean disposal, reports said. Disposal of radioactive wastes from nuclear power plants is carried out under international surveillance mechanisms, Japanese officials reportedly assured Philippine representatives. [Text] [OW070210 Hong Kong AFP in English 0143 GMT 7 Sep 81]

CSO: 5100/2329

SHIRE COUNCIL FIGHTS TO KEEP ATOMIC PLANT BUFFER ZONE

Sydney THE SYDNEY MORNING HERALD in English 7 Aug 81 p 8

[Article by Dennis Shanahan]

[Text] Sutherland Shire Council is trying to block plans to remove an outer "buffer" zone around the Atomic Energy Commission's research establishment at Lucas Heights.

The council has been informed that building restrictions within a 4.8km radius of the research centre may be eased.

Easing of the restrictions would allow higher density housing and would allow hospitals and food-processing plants to be sited within the buffer area which runs 1.6km to 4.8km from the centre.

The restrictions now prevent the construction of large institutions and limit 5,000 people to each 20 degree sector of the zone.

Sutherland Council has decided to ask the State and Federal Governments to maintain the zoning around the centre until the Federal Government guarantees that the research centre will not be used for nuclear production. There are two small nuclear reactors at the centre which are used for research.

The proposed changes are outlined in a report being compiled by the Australian Atomic Energy Commission on the safety requirements of the Lucas Heights centre. The commission has indicated to the council that it does not believe the building restrictions outside the 1.6 km limit will be necessary.

The commission maintains that improvements in the Lucas Heights equipment will render the restrictions unnecessary.

Last night, the President of Sutherland Shire Council, Councillor Allan Andrews, said the buffer zone was created under State planning legislation on behalf of the Federal Government when the centre was built. He said the inner buffer was to provide a safety area for radio-active spillages and the outer zone to protect people against windborne wastes in the event of an accident.

The Prime Minister, Mr Fraser, has sent a letter to the Premier, Mr Wran, which says the review will not be finished until next year. A spokesman for Senator Carrick said yesterday that the Government had not made any decision on the buffer zone.

Local residents have previously opposed any proposals to change the restrictions on the buffer zone.

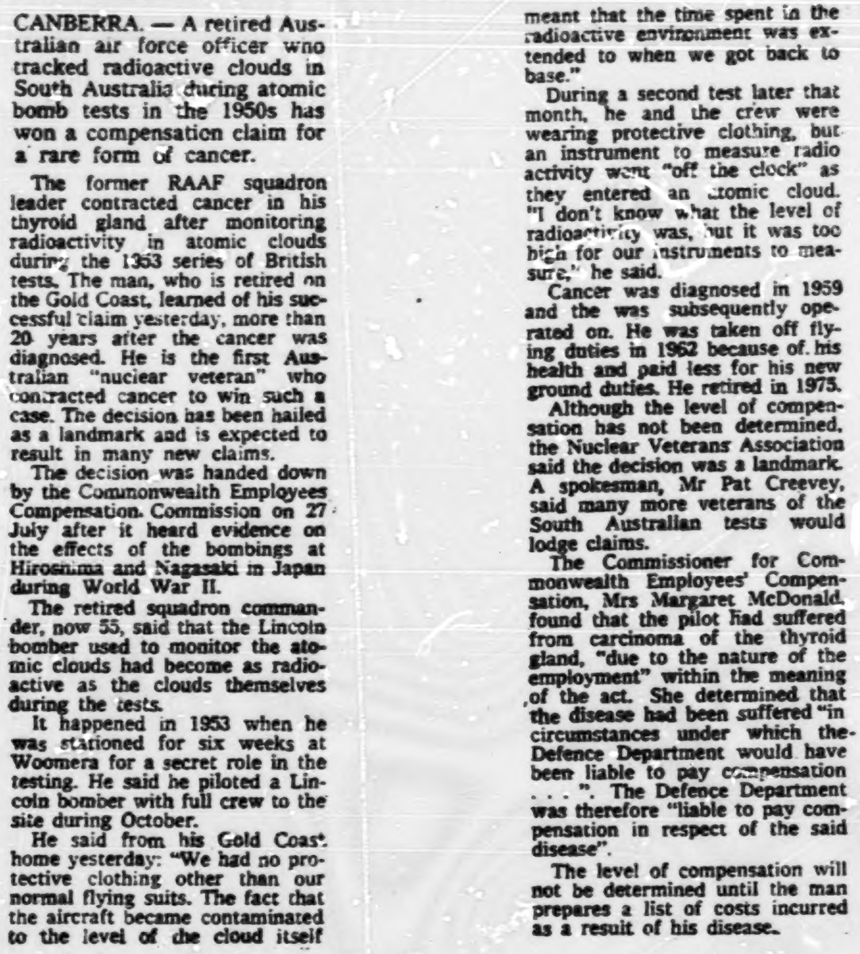
CSO: 5100/7554

EX-PILOT FIRST TO WIN RADIOACTIVITY COMPENSATION CLAIM

Melbourne THE AGE in English 7 Aug 81 p 1

[Article by Tom Ormonde]

[Text]



CANBERRA. — A retired Australian air force officer who tracked radioactive clouds in South Australia during atomic bomb tests in the 1950s has won a compensation claim for a rare form of cancer.

The former RAAF squadron leader contracted cancer in his thyroid gland after monitoring radioactivity in atomic clouds during the 1353 series of British tests. The man, who is retired on the Gold Coast, learned of his successful claim yesterday, more than 20 years after the cancer was diagnosed. He is the first Australian "nuclear veteran" who contracted cancer to win such a case. The decision has been hailed as a landmark and is expected to result in many new claims.

The decision was handed down by the Commonwealth Employees Compensation Commission on 27 July after it heard evidence on the effects of the bombings at Hiroshima and Nagasaki in Japan during World War II.

The retired squadron commander, now 55, said that the Lincoln bomber used to monitor the atomic clouds had become as radioactive as the clouds themselves during the tests.

It happened in 1953 when he was stationed for six weeks at Woomera for a secret role in the testing. He said he piloted a Lincoln bomber with full crew to the site during October.

He said from his Gold Coast home yesterday: "We had no protective clothing other than our normal flying suits. The fact that the aircraft became contaminated to the level of the cloud itself meant that the time spent in the radioactive environment was extended to when we got back to base."

During a second test later that month, he and the crew were wearing protective clothing, but an instrument to measure radio activity went "off the clock" as they entered an atomic cloud. "I don't know what the level of radioactivity was, but it was too high for our instruments to measure," he said.

Cancer was diagnosed in 1959 and the was subsequently operated on. He was taken off flying duties in 1962 because of his health and paid less for his new ground duties. He retired in 1975.

Although the level of compensation has not been determined, the Nuclear Veterans Association said the decision was a landmark. A spokesman, Mr Pat Creevey, said many more veterans of the South Australian tests would lodge claims.

The Commissioner for Commonwealth Employees' Compensation, Mrs Margaret McDonald, found that the pilot had suffered from carcinoma of the thyroid gland, "due to the nature of the employment" within the meaning of the act. She determined that the disease had been suffered "in circumstances under which the Defence Department would have been liable to pay compensation . . . ". The Defence Department was therefore "liable to pay compensation in respect of the said disease".

The level of compensation will not be determined until the man prepares a list of costs incurred as a result of his disease.

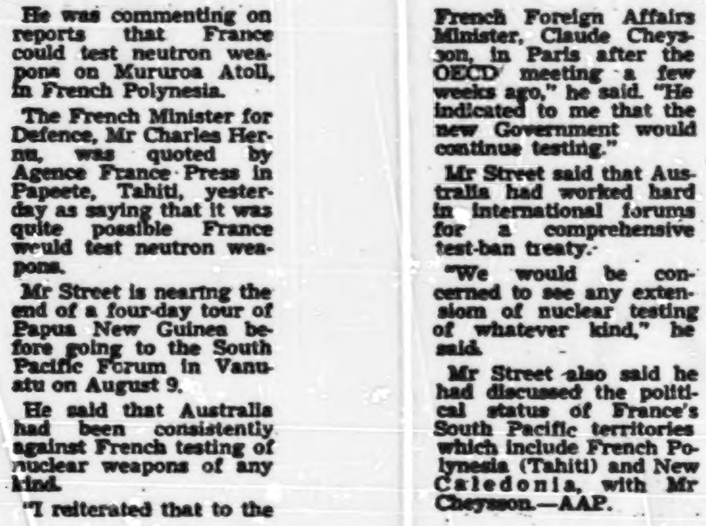
CSO: 5100/7554

GOVERNMENT OPPOSES FRENCH NUCLEAR TESTS IN PACIFIC

Street Remarks

Perth THE WEST AUSTRALIAN in English 4 Aug 81 p 31

[Text] Port Moresby, Mon--Australia would be worried about any extension of nuclear testing "of whatever kind" by France in the South Pacific, the Minister for Foreign Affairs, Mr Street, said today.



He was commenting on reports that France could test neutron weapons on Mururoa Atoll, in French Polynesia.

The French Minister for Defence, Mr Charles Hernu, was quoted by Agence France Press in Papeete, Tahiti, yesterday as saying that it was quite possible France would test neutron weapons.

Mr Street is nearing the end of a four-day tour of Papua New Guinea before going to the South Pacific Forum in Vanuatu on August 9.

He said that Australia had been consistently against French testing of nuclear weapons of any kind.

"I reiterated that to the French Foreign Affairs Minister, Claude Cheysson, in Paris after the OECD meeting a few weeks ago," he said. "He indicated to me that the new Government would continue testing."

Mr Street said that Australia had worked hard in international forums for a comprehensive test-ban treaty.

"We would be concerned to see any extension of nuclear testing of whatever kind," he said.

Mr Street also said he had discussed the political status of France's South Pacific territories which include French Polynesia (Tahiti) and New Caledonia, with Mr Cheysson.—AAP.

Anthony Comments

Melbourne THE AGE in English 10 Aug 81 p 1

[Article by Russell Skelton]

[Excerpts] Port Vila, 9 August--Australia has called on France to give self-government to its colonial territories of New Caledonia and French Polynesia.

The Deputy Prime Minister, Mr Anthony, said today that Australia endorsed the demands of the 11 South Pacific nations for self-determination in the territories.

Mr Anthony's comments on New Caledonia are the Government's firmest. They were made after he talked to South Pacific leaders today on the eve of the twelfth South Pacific Forum.

Mr Anthony and the Foreign Affairs Minister, Mr Street, said Australia opposed French nuclear tests in the Pacific. France has announced that it intends to test a neutron bomb.

Mr Anthony said: "We share the Pacific islands' concern of more nuclear explosions and also the dumping of nuclear waste material in the Pacific."

CSO: 5100/7554

AUSTRALIA

ACTU ACCUSED OF EXAGGERATING URANIUM MINING RISKS

Canberra THE AUSTRALIAN in English 7 Aug 81 p 2

[Text] THE ACTU was accused yesterday of exaggerating the risks of uranium mining by distributing a "misleading and ideologically slanted" pamphlet.

The Uranium Information Centre said the pamphlet was based on discredited studies by poorly qualified scientists.

The centre also charged that the material was unbalanced and "full of omissions".

But environmentalists and union leaders hit back, claiming the Uranium Information Centre was "slanted in favor of the nuclear industry".

An ACTU spokesman in Melbourne said the pamphlet, entitled Uranium and Workers' Health, had been prepared on the basis of a wide range of leading studies of low-level nuclear radiation.

The Uranium Information Centre's general manager, Mr Derek Hampson, described the pamphlet as "positively harmful to any factual debate on nuclear power".

The latest World Health Organisation study of radiation contradicted the pamphlet.

People tended to look for the sort of information they wanted on nuclear power and the ACTU pamphlet relied on the opinions of people who were not experts.

"The president of the ACTU, Mr Dolan, is openly committed to stopping the development and export of Australian uranium and the trade union movement could shut down the uranium industry by industrial disruption", Mr Hampson said.

There were dangers in the mining of uranium, as in all mining, but they were not excessive and could be controlled, and radiation was well understood scientifically.

The ACTU's assistant secretary, Mr Bill Richardson, said that if the unions were slanted towards protecting workers' health, this was in contrast to the centre whose established purpose was to protect corporate wealth.

"The concern of the uranium companies is understandable because the studies referred to in the ACTU leaflet mean that chronic low-level radiation is more hazardous than had been thought," Mr Richardson said.

Mr John Halfpenny of the Amalgamated Metalworkers and Shipwrights Union said there was increasing evidence from around the world that there were serious hazards in uranium mining.

A spokesman for the Friends of the Earth committee on uranium said the centre's stand was natural because its aim was "to sell the uranium industry rather than to inform people".

The centre, set up to provide information about uranium to the public, is sponsored by private subscriptions, contributions from embassies in Australia and some mining companies.

CSO: 5100/7554

BRIEFS

URANIUM FOR FRENCH--Canberra--Australian uranium miners are soon expected to start a huge export program to France. The French National Assembly has removed the last obstacle to Australian exports of uranium to France and already several Australian companies are in the advanced stages of negotiations on uranium sales. Australia has had a uranium safeguards agreement with France for several months but it has not yet been ratified because of the refusal of the French Government to allow inspections by the International Atomic Energy Agency of its nuclear plants. The National Assembly has now overturned that decision and the treaty with Australia is expected to be ratified almost immediately. The French Government has told Australia its nuclear power program by the end of the 1980s will demand annual imports of about 10,000 tonnes of uranium. Australia is expected to capture between 1000 and 2000 tonnes of the market each year. Some French companies are also interested in developing enrichment plants in Australia. The Prime Minister, Mr Fraser, recently predicted Australia would be using nuclear power plants in the next 20 years. In Townsville, Minatome Australia Pty Ltd operations manager, Mr Keith Folwell, said last night the decision would have little effect on the French-controlled group. He said Minatome expected to sell uranium from its Ben Lomond discovery near Townsville on the world market. "We expect our cost of production to be comparatively low, and we will be able to sell competitively around the world," he said. [Text] [Brisbane THE COURIER-MAIL in English 30 Jul 81 p 26]

RANGER URANIUM DEVELOPMENT--Energy Resources of Australia spent a massive $41.3 million on the Ranger uranium project in the June quarter. The large outlays allowed the company to complete the treatment plant, the final stages of which are still to be commissioned. The company is set to produce its first yellowcake. The mine is scheduled to start full scale production in October. The total amount spent did not include an amount of $12.4 million in capitalised interest payments on the loans raised to finance the construction of the mine. The project involves a whole range of construction work, including developing the open cut mine, building the tailings dam, the water management system and the treatment plant, creating the on site infrastructure and also ERA's share of the costs of constructing the Jabiru township. Directors said no exploration had been done since May when ERA announced that drilling on the Number Three ore body had lifted reserves by 13,803 tonnes to 124,681 tonnes of contained uranium. The mine is expected to produce about 3000 tonnes a year. Ranger now has contracts for a total of 42,700 tonnes of uranium over the next 15 years. Ranger confirmed yesterday that an export shipment of yellowcake from Darwin last month, organised by Queensland Mines, included five containers of uranium oxide owned by Ranger. The yellowcake had not been produced at Ranger but came from Government stockpiles, a senior Ranger executive said. [Text] [Melbourne THE AGE in English 6 Aug 81 p 18]

MUNDONG URANIUM FAILURE--The Mundong Well uranium prospect being explored by Newmex Exploration and Griffin Coal Mining Company has been written off as uncommercial by a consulting geologist. In their June quarterly report released yesterday, Newmex directors said they had received verbal advice that Griffin was ready to pull out of the project. [Excerpt] [Melbourne THE AGE in English 6 Aug 81 p 18]

CSO: 5100/7555

COUNTRY'S FIRST NUCLEAR REACTOR OPERATIONAL IN '83

Dacca THE BANGLADESH OBSERVER in English 26 Jul 81 p 1

[Text] Savar (Dacca) July 25:--The first nuclear reactor in the country is expected to go into operation at the Atomic Energy Research Establishment at Savar, by April 1983 reports BSS.

This was stated to newsmen by Dr. R. A. Ghani State Minister for Science and Technology while visiting the under-construction reactor building today.

The three mega watt Triga research reactor is a Taka 13.37 crore project including Tk. 8.37 crore in foreigh exchange and the entire project is being financed by Bangladesh from its own cash resources.

The cost of the reactor equipment is Taka 7.5 crore while the construction cost of the reactor building is Taka 2.5 crore the Minister said.

Production of radio isotopes required for nuclear medicine, agriculture and industry will be one of the main uses of the reactor. This will also support various research and development activities in the fields of nuclear physics, reactor physics, solid state physics, nuclear chemistry, electronics engineering, nuclear mineral and materials and in all other fields where intense neutron and gamma radiation are required.

The reactor will also create supporting facilities for training of nuclear personnel for the nuclear power programmes in the country.

Dr. Ghani said that 10 percent work of the reactor building had already been completed and the rest was expected to be completed by April 1982.

CSO: 5100/7149

OFFICIAL REPORTS ON URANIUM STOCK AT HYDERABAD

Bombay THE TIMES OF INDIA in English 13 Aug 81 p 7

[Text] Hyderabad, August 12 (UNI)--The nuclear fuel complex here is left with only three tonnes of enriched uranium, according to its chief executive, Mr N. Kondala Rao.

He said that the fabrication plant at Hyderabad, which supplied the fuel to the Tarapur plant, would work to full capacity only till the beginning of next month.

After that, the scrap material will be processed at the plant which may keep it going until the end of next year at one-fifth of the actual capacity.

The plant worked partially for eight months last year because of various bottlenecks in the supply of uranium by the United States. Mr Carter had cleared two consignments of enriched uranium for India last September. Of this, the first one--19.3 tonnes was released immediately. The plant is left with three tonnes of this consignment.

The agreement was that the supply of second consignment would be reviewed by August and the talks for the supply were now in progress.

Asked what would happen to the fabrication plant if the supply of enriched uranium was stopped by the United States, Mr Rao said it would not be kept idle. There were two alternatives, he pointed out. The first was to get a supply from other sources like the USSR. The second was to find an alternative fuel like mixed oxide fuel (MOX), on which work was going on.

Plutonium Oxide

He said MOX, which had plutonium oxide, could not be fabricated at the NFC. However, he said all work regarding the cladding operations would be done at the plant here.

Mr Rao said even if MOX fuel was chosen for the Tarapur plant, part of the fabrication work would have to be done at the NFC. The capacity of the enriched uranium plant is 20 tonnes a year.

Referring to the fabrication of the natural uranium, Mr Rao said the present capacity of 100 tonnes a year would be doubled to 200 tonnes and the expanded plant would become operative by 1982. Civil works had already begun and the expansion would cost Rs four crores.

Mr Rao said the plant was fabricating natural uranium for supply to the Kota, Narora and Kalpakkam reactors.

Each reactor, with a 235 MW unit, would require 30 tonnes of reload and 45 tonnes of initial fuel. Since the Kakrapara (Gujarat) plant had also been cleared, the demand for the natural uranium fabrication would go up. He said it was planned to increase the capacity of the plant to 600 tonnes a year by 2000 A.D.

The zirconium plant capacity would be doubled from the present 125 tonnes to 350 tonnes a year by 1983. The total cost of the expansion programmes was estimated at Rs ten crores, he said.

CSO: 5100/7144

BRIEFS

HEAVY WATER PLANTS--New Delhi, Aug. 27--India proposes to set up three additional heavy water plants to meet nuclear power programme requirements, Mr C. P. N. Singh, told the Rajya Sabha today, reports PTI. The Prime Minister informed the Rajya Sabha that the Government had appointed a committee to select a suitable site to set up an atomic power plant in Karnataka. In a written reply she said that a decision would be taken after receiving the recommendations of the committee. [Text] [Calcutta THE STATESMAN in English 28 Aug 81 p 9]

CSO: 5100/7150

DAILY VIEWS DISAGREEMENTS ON NUCLEAR SAFEGUARDS

PY040003 Rio de Janeiro BRAZIL HERALD in English 2 Sep 81 p 2

["Nuclear Suspicion": Summary of editorial from Sao Paulo O ESTADO DE SAO PAULO of 30 August]

[Text] A message for reapproximation recently transmitted to the Brazilian Government by Subsecretary of State Thomas Enders, leads to the belief that U.S.-Brazilian relations still are not going to be improved as much as the international situation should suggest. Recent complications involving supply of enriched uranium for the Angra I nuclear plant indicate that more time will be needed before the relations between the two countries reach again the level they had immediately after World War II. Both governments are taking clear, but opposite, positions on a sensitive problem, and there is little likelihood of removing the obstacles, except if President Reagan followed the example of President Carter in the latter's agreement with India on a similar issue.

U.S. authorities seem to believe that there exist in Brazil installations for the reprocessing of uranium which should be subject to international safeguards. The gist of the divergency lies in the fact that Brazil, having refused to sign the international agreement on non-proliferation of nuclear arms, has however consented to submit "foreign" nuclear energy installations to international control, but not those produced in Brazil.

The Angra I reactor was made in the United States by Westinghouse. It is therefore a "foreign" installation and therefore liable to foreign control. On the other hand, installations for reprocessing of uranium also existing in Brazil were assembled with parts acquired separately in France, or donated by Germany, and some were made in Brazil. This reprocessing unit therefore is considered Brazilian by the Brazilian authorities which therefore refuse to permit any foreign inspection. According to the Washington view, this unit has a capacity for reprocessing which should make it liable to international safeguards.

Either government is sure to consider the question correctly and from a legal angle. As a non-signatory of the Non-Proliferation Pact, Brazil can refuse inspection of nuclear energy equipment considered national. On the other hand, U.S. laws forbid the export of enriched uranium to countries refusing inspection of reprocessing equipment, although the U.S. president has powers to permit such exports.

Anyway, the United States can exert strong pressure on Brazil, refusing to supply uranium for the Angra I plant which is scheduled to start operation by the end of this year. There is a possibility that a European consortium, URENCO, will supply the uranium which Westinghouse does not send, but this is not certain. Under the nuclear agreements between Brazil and Germany, URENCO only would supply uranium for the Angra II plant and those to be completed later.

The problem shows that Brazil's nuclear energy program has, besides other inconveniences, also that of making the country dependent on foreign uranium supplies, creating a dependency similar to that of foreign oil.

Brazil's attitude, in any case, must arouse foreign suspicion on the true aims of the nuclear program. Such a suspicion, if not quickly removed, may involve Brazil in international difficulties.

CSO: 5100/2324

OBSERVANCE OF 'NUCLEAR DAYS' REPORTED

Tananarive MADAGASCAR-MATIN in French 7 Aug 81 pp 1, 6

[Text] "Nuclear Days" were kicked off yesterday morning by Professor Raoelison Andriambololona, director of the Nuclear and Applied Physics Laboratory (LPNPA), in the presence of the PRDM [expansion unknown] minister for finance and planning, Rakotovao-Razakaboana, and numerous officials from the minister of higher education and scientific research, as well as representatives from the diplomatic corps.

This opening ceremony was most importantly distinguished by the presentation of the material and equipment utilized by the LPNPA, for science and laboratories must not stand still: on the contrary, they should work for the well-being of society.

The LPNPA, which was established 11 March 1978, has a twofold objective. First, it is meant to serve the country's needs, both in terms of basic research and also in terms of applied research, through the local training of Malagasy scientists.

Second, it is to make its contribution to the struggle for the (economic, social...) development of the country, by utilizing local resources as much as possible, in terms of both human potential and technology.

Mastery of Nuclear Technology

Because of this, the LPNPA has first of all begun to master and expand the utilization of nuclear technologies capable of assisting Madagascar's development, in the fields of mineralogical analysis, by providing itself with sufficient high-quality equipment, and by on-site training of a corps of local research personnel.

Starting from scratch in 1976, without even having a roof over its head, the LPNPA now employs 18 people, going from the level of state doctor of science to diploma in advanced studies (DEA), and three electronic technicians.

The LPNPA has made analyses of uraniferous rock on Madagascar and boasts some 20 publications (including six DEA reports), running the gamut from line spectrum analysis of uraniferous rock (monazite, uranothorianite, betafite...) to the concentration of the Radon-22 in our rocks, not to mention theory, basic research measurements (emission spectrum of Americium-241, Radium-226, and their descendents, neutron cloud chamber study).

Broad Range

Starting in 1977, instruction at the DEA level has been given which covers various branches of physics: nuclear technology, nuclear analysis, nuclear physics, atomic and molecular physics, theoretical physics, solar energy, the energy problem.... This rather broad range was provided in order to give DEA students training in more than one field, so they may be reconverted later, if necessary.

The scientific equipment has been in operation for several years now, and has among other things made possible the laboratory analysis of radioactive ore (measuring the concentration of uranium (U) in Thorium (Th), in the ratio U/Th) and of non-radioactive ore by means of X-rays.

In order to diversify LPNPA's activities, officials are looking forward to developing research in directions that mutaully reinforce and complement each other, in the years ahead.

We note that LPNPA gets aid from Malagasy governmental bodies, as well as foreign and international bodies, in the form of donations of research equipment and through the sending of experts and visiting professors. Among those bodies is the ministry of higher education and scientific research, the ministry of secondary and primary education, the Malagasy National UNESCO [United Nations Economic Social and Cultural Organization] Committee, the International Atomic Energy Agency (IAEA), and its representative in Antananarivo (UNDP) [United Nations Development Program], the rectorate of the University of Madagascar, the French Embassyin Madagascar, and the French directorate of international academic relations.

Our nuclear physicists:

Research and Teaching Personnel:

Raoelina Andriambololona, director
Ramiaramanana Desire
Ratiarison Adolphe
Mrs Razanajatovo Mariette
Miss Rakotoson Georgette
Lahatra Razafindramisa
Randrianarivony Edmond
Ramamonjy Rabedaoro Gilbert
Miss Randriantsoa Nirifenoanitra Esther
Raboanary Rolland
Razafimbahoaka Fy
Ranaivo Harisoa Rodolphe
Mr Raberanotrona
Ramanana Jean Bienvenu
Rasamimonana Francois de Salle

Technical Personnel:

Razakaboay Benjamin
Ranoharison Maurice
Rarivomanana Jean

IAEA Expert:

Professor Jan Tys

9516
CSO: 5100/4957

BRIEFS

JAPAN-NIGER ACCORD--Niger and Japan today signed a protocol accord for the exploration, development and exploitation of uranium in the Agadez region. After the signing of the protocol accord, the association comprising two partners--(?CFC) for Japan, and ONAREM for Niger--will obtain a license for exploration for 4 years in the (Binatra) zone. [Niamey Domestic Service in French 1900 GMT 9 Sep 81]

LIBYAN, IRAQI URANIUM PURCHASES--Paris, 28 Aug--Libya bought 1,212 tons of uranium from Niger in the first six months of this year--six times more than in 1980--and for the first time Iraq has bought uranium from Niger, with a 100-ton order this year. The figures were disclosed in the official journal of the Republic of Niger published in Niamey yesterday. The figures show that these two Arab states, Libya and Iraq, accounted for nearly a quarter of the 4,846 tons exported by Niger in the first half of this year. Reliable sources said that these surprising figures might reflect a settlement of purchases made in earlier years. According to the official journal, Libya bought 258 tons from Niger in 1978, 150 tons in 1979 and 380 tons in 1980, suggesting that the large figure for 1981 is an accounting adjustment to account for these deliveries. But observers said that Libya's purchases were still high by comparison with Tripoli's nuclear capacity. Libya has only a small nuclear research reactor supplied by the Soviet Union which uses about ten kilos (about 22 pounds) of enriched uranium a year at most. (AFP) [Text] [Paris AFRICA AFP in English 1 Sep 81 p 5]

CSO: 5100/4963

GOVERNMENT ASKED TO EXPLAIN CHOICE OF NUCLEAR POWER

Johannesburg THE STAR in English 2 Sep 81 p 24

[Editorial: "A Lazy Way to 'Go Fission'"]

[Text] ON the issue of nuclear energy the South African public is among the world's most acquiescent. Apart from a sporadic and thinly supported campaign in the Western Cape there has been no sign of the emergence of an "anti-nuke" lobby. It seems a fair bet that even yesterday's report, that a second nuclear power station is to be positioned on the Eastern Cape coast, will provoke surprisingly little interest. The nuclear industry, naturally enough, has from time to time commended the public for its "constructive" attitude but this belies the real situation. The fact is that the public has no clear idea of what is at stake and only the vaguest notion of the economics involved. This is as much because of our strange national apathy towards big Government decisions as of the public being fed minimal information. While other countries' governments have gone out of their way to debate the issues with the public, and even to hold referenda, public involvement here has relied on handouts to the media and pronouncements at technical conferences.

Does South Africa need to go nuclear? The capital costs are enormous and the myth that atomic power is cheap has long been exposed. Indeed the margin of economic preference between nuclear and coal energy narrows almost by the day. Koeberg, if one includes the enrichment process, will cost in the region of R4 000-million — all that for a power station producing a third of the output of coal-fired Matla or Duva.

The question of nuclear safety has been argued to death and the risks are far less now than they used to be. Certainly to stop nuclear energy on the grounds of a "worst case accident" would be as backward as barring jumbo jets from the skies because of the risk that one might crash into a city. Nuclear energy is a major boon and may one day be a vital necessity for mankind. There is no need to become irrationally emotive about its dangers.

Nevertheless, questions should be asked and answers given, not only about precautions, but also about costs. Unilaterally the Government has decided to pin our energy hopes on nuclear power at the cost of research and development of alternative power sources (solar, for instance). The public is entitled to know the reasoning for this, and whether the expense is justified.

CSO: 5100/4966

PROBLEM OF ENRICHED FUEL FOR KOEBERG PARTIALLY RESOLVED

Johannesburg THE STAR in English 31 Aug 81 p 18

[Article by John D'Oliveira]

[Text] South Africa's Electricity Supply Commission and the United States Department of Energy have partially resolved the expensive deadlock over fuel for the Koeberg power station.

In terms of a 1974 contract worth — ultimately — billions of dollars, Escom is contracted to supply the Doe's Oak Ridge, Tennessee, processing plant with successive consignments of 300 000 kilograms of uranium ore.

Each consignment will be worth about 30-million dollars and the processing will add another 28-million dollars to the value of the ore.

Unfortunately for Escom, the United States' 1978 Nuclear Non-proliferation Act prohibits the United States government from providing an export licence for the enriched fuel because South Africa does not apply International Atomic Energy Agency safeguards to all its nuclear facilities.

Thus Escom faced a catch 22 situation — and the possibility of penalties of 16,9-million dollars (if the first delivery did not take place) and 77,6-million dollars (if the entire contract was scrapped).

The thorny issue was discussed when South African Foreign Minister Pik Botha visited America in May and it was decided that the deadline for the supply of the fuel feedstock would be extended to August 31.

A spokesman for the Department of Energy has confirmed that Escom had agreed to abide by the contract and supply the ore.

The next day the Doe will provide Escom with 50 000 kilograms of enriched uranium.

However, the Doe has agreed not to invoice Escom for the enrichment fee until the export licence issue is settled — one way or another.

The key to the entire problem is the South African Government's refusal to place its nuclear fuel enrichment installation at Valindaba under IAEA safeguards for fear that this might compromise the secrecy of the process.

In an effort to resolve the problem, the Americans have said they would negotiate with South Africa and try to show South Africa that IAEA safeguards can be applied to Valindaba without disclosing any secrets.

However, while this relieves the immediate pressure, the problem appears to be a long way from a full solution.

Even if South Africa and the United States can work out satisfactory safeguards for Valindaba (and thus meet the requirements of the 1978 legislation), current United States policy precludes the supply of nuclear fuel to any country which has not signed the Nuclear Non-proliferation Treaty.

This policy was laid down by the Carter administration and accepted by the Reagan administration.

It is possible, though believed unlikely at this stage, that the administration might retreat on the policy aspect and allow the export of the fuel if South Africa can meet the requirements of the Nuclear Non-proliferation Act.

CSO: 5100/4966

SAFETY OF KOEBERG NUCLEAR PLANT DISCUSSED

Wind-borne Radiation

Johannesburg RAND DAILY MAIL in English 1 Sep 81 p 3

[Text THE Cape Town City Council had long been aware of "wind vagaries" that might carry radioactive gas from the Koeberg nuclear power station to the city and had taken this into account in its emergency planning, the acting medical officer of health, Dr Alec Chaimowitz, said yesterday.

Dr Chaimowitz was commenting on a study recently released by scientists of the Atomic Energy Board which found that a reactor gas leak could, under certain weather conditions, raise radiation levels in the central city area even when opposing ground-level winds were blowing.

Wind currents

The study said that in a three-year monitoring period a number of diverse patterns had shown up, some of which bore no relation to the usual wind currents. In one case, balloons released at Koeberg had travelled westwards out to sea, then northwards to touch the coast again before curling south, to come ashore at Cape Town.

The latest recommendations of the city's executive committee call for radiation detectors based in electrical substations ringing the city and linked by telephone cable to the city's civil defence control room.

The system, aimed at detecting atmospheric radiation, will operate independently of the radiation monitors operated by Escom on sites around Koeberg.

Geological Stability

Johannesburg THE CITIZEN in English 5 Sep 81 p 4

[Text]

DETAILED investigations had proved without exception that the site of the Koeberg nuclear power station was situated in a geological and hydrologically stable area of low seismicity, the Minister of Mineral and Energy Affairs, Mr F W de Klerk said yesterday.

Replying to a question by Mr Roger Hulley (PFP Constantia) he said the site studies had been done by the Bernard Price Institute of the University of the Witwatersrand, the Geological Survey Section of his department, Escom and well-known American consultants.

"The excavations for the foundations of the Koeberg power station exposed some 30 000 square metres of bedrock found to be penetrated by small borings in which small marine animals lived more than a million years ago.

"Although these borings extended across seams and cracks in the rock, no indication of displacement could be found in the borings. This proved conclusively that no disturbance of the bedrock had occurred since that time," he said.

CSO: 5100/4966

URANIUM MINING TO BEGIN BEFORE 1985 OR LATER

Lusaka SUNDAY TIMES in English 30 Aug 81 p 3

[Article by Arthur Simuchoba]

[Excerpts] For Zambia, the prospect, at least for the moment, is not so much one of building a nuclear reactor, but of cashing in on the lucrative trade in uranium, the nuclear fuel.

Demand for and the importance of this mineral is bound to increase. Uranium is in fact already a strategic mineral.

It is an open secret, for instance, that one of the reasons for the West's delaying tactics over Namibia are the huge uranium deposits at Rossing in that territory.

Big business is at pains to allow any process that may render accessibility to the deposits uncertain.

Zambia may not have deposits as extensive as those of Namibia. But geologists have long had reason to believe that there is uranium in this country. Not until recently, however, has the search for the mineral intensified.

Not too long ago, the Prescribed Minerals and Materials Commission (PMMC), the Government body which oversees the handling of prescribed minerals and materials granted prospecting, exploration and mining licences to three international companies which are now prospecting for the mineral.

Modern uranium prospecting depends a great deal on aerial surveys. The process is aided by the fact that uranium is radioactive.

Extra-sensitive equipment fitted in planes monitors radioactivity on the ground. Where indicative readings are recorded, the area is termed an anomaly and ground investigations may proceed. Several anomalies, have been identified in Zambia over the years.

Deposits are said to be many and scattered. The older and best known however are in the Southern and North-Western Provinces while the Eastern Province has also some potential.

Investigations of other promising areas continue.

The Zambezi escarpment, however, is the major arena. All the three companies now prospecting in Zambia have licence areas in Zambezi Valley.

Agip SPA of Italy have a licence for the Kariba area and North-Western Province.

Their German counterparts Saarberg Interplan are prospecting in Siavonga, Luangwa (Feira) and one area situated in the Central, Copperbelt and North-Western provinces.

Power Reactor and Nuclear Fuel Development Corporation of Japan worked in the Lumezi area, Eastern Province and are now in the Sinazongwe area, again in the Zambezi Valley.

Agip, which appears to be the oldest uranium prospector in the country, has been doing so since about 1970. After spending about K4 million it was reported that the company had discovered an extensive uranium deposit in the Siavonga area.

The last that was heard of these deposits is that they were being evaluated to find out their quality.

The same company was reported in 1979 to have started drilling, an advanced stage of prospecting, at Nakande in Chief Munyumbwe's area, Gwembe.

The same operation which was carried out by the Roan Consolidated Mines (RCM) started on March 7, last year.

The Kawanga deposits are said to contain 0.14 per cent uranium, which is said to be enough to make mining viable.

Drilling was also reported to be in progress at Kimali near Mwinilunga. Overall, Agip is reported to have spent over K15 million in uranium prospecting. Up to date details of what progress this company has made were not available.

The more cooperative, German Parastatal, Saarberg Interplan has been established in Zambia since November 1979.

Surveys

The company is engaged in prospecting in three licence areas, Siavonga, Luangwa and in one big area covering the Central, Copperbelt, and North-Western Provinces.

Last year, two airborne surveys were undertaken over the Siavonga and Luangwa areas.

They were the first heliborne surveys ever undertaken in this country.

The data was processed and interpreted which resulted in a number of ground prospecting targets being identified.

Ground prospecting is expected to begin this year in Siavonga.

In the north of the country another airborne survey is being completed. Already a number of anomalies have been recorded with the result that ground prospecting is now on.

Most of the airborne surveys are carried out by a reputable Nairobi-based company Geo-Survey which is said to have up to date equipment for the purpose. The countractor's planes are based at Ndola airport.

An on the site geophysicist and his staff from the contractor evaluate the data which enables immediate ground checks.

The company will carry out another airborne survey over the Zimbabwean part of the Zambezi Valley, adjacent to their licence areas in Zambia.

From this exercise, a feed back for uranium prospecting operations in Zambia is expected.

The German parastatal's mineral prospecting and investment strategy stipulates an expansion of the search for uranium and other minerals from Zambia into other African countries of which Lusaka will be headquarters.

The company also recently agreed to work with the Ministry of Mines in prospecting for coal in the Western Province. Two of the company's geologists will soon arrive in the country for the project.

At least 20 Zambians are employed by the company and more will be recruited as the project gathers momentum.

There are plans to employ at least two Zambian mining graduates although this is not too easy in a country whose economy is dominated by mining.

In May last year, the commission signed another uranium prospecting agreement with the Power Reactor and Nuclear Fuel Development Corporation of Japan after two years of negotiations.

The Japanese parastatal had done work in the Eastern Province. Between 1973 and 1974 it surveyed the Lumezi area near Lundazi and reported "great potential" for uranium.

Later it applied for a licence for the Chama area to prospect for uranium and another mineral known as thorium.

Currently, it is working in the Zambezi Valley, in the Sinazongwe area. Five geologists are based at the company's camp at Nkandabwe, the former coal mine.

The company which employs about 140 Zambians has hired Brunelli and SIDCO companies in their licence areas.

An aerial survey has already been completed and most of the work is now on the ground.

Estimates

The company estimates that it will have done most of the necessary work in half of its licence area by the end of this year. The rest of the area will be covered next year.

About K1 million is budgeted for this year's operations although of course the actual cost is likely to be much higher.

Since all the three companies have had to work in the Gwembe Valley, they have had to contend with the problem of landmines planted by the former Rhodesian rebel army of Ian Smith.

Agip had to suspend drilling in Siavonga following the death of 17 of its employees in May 1980 after the vehicle they were travelling in hit a landmine.

The problem of landmines has been the major bottleneck to the prospecting exercise.

Now, however, the Zambia Army is clearing the landmines in most areas and has promised to do the same in those areas where they have not yet done so.

In Siavonga, for instance, Zambian soldiers have cleared the area of landmines and are presently grading it.

The holders of the licence for the area, Saarberg Interplan, helped financially in the exercise.

The army has promised to clear landmines and grade the Luangwa area in the near future. This exercise is only part of a larger one by the army to clear the Zambezi Valley of the dreaded mines.

This should be a tremendous boost for the uranium prospecting programme and the licence holders, at least the Germans and Japanese, said they appreciated the move a great deal.

All therefore seems set for unimpeded uranium prospecting in the country. In fact, by some accounts, landmines were only a recent impediment.

A long standing one is said to have been the lack, until recently, of support for the uranium prospecting programme from the crucial bigwigs of the Ministry of Mines.

Had this programme received this support when it was drawn up, it is said Zambia would have had a uranium mine by now.

Work on the uranium programme was completed by the geological survey department at the end of 1975 and recommendations were submitted to the authorities so that all that remained was signing the agreement with Agip.

Three years, however, elapsed before the agreement was finally signed.

Things have changed considerably since that time. The Ministry of Mines is no longer known for its lassitude. Several agreements for the prospecting of energy minerals, not only uranium have been signed.

Only the other week, Mines Minister Mr Mufaya Mumbuna signed an agreement with a Canadian company for oil prospecting. There are also agreements on coal.

Though it will be 1985 or later before Zambia can start mining uranium, there is no doubt that matters are getting to ahead and at the right time too as the recent United Nations-sponsored conference on new and renewable energy sources in Nairobi demonstrated.

While there can be no guarantee that huge, high grade deposits will be found, there is in the words of one geologist: "every reason to be optimistic of the future given Zambia's past records...."

CSO: 5100/4963

PAPER URGES NEW POLICY ON HANDLING OF NUCLEAR WASTE

Helsinki HELSINGIN SANOMAT in Finnish 9 Aug 81 p 2

[Editorial: "Nuclear Waste Study Off to Slow Start"]

[Text] Finland's future nuclear power policy must be examined from the point of view of its weakest link. Then, without a doubt, emphasis will be placed on the final disposition of nuclear waste, which has not to date been resolved in a satisfactory manner. Thus, it is to a great degree a question of whether our country as a producer of dangerous nuclear waste is also capable of bearing the responsibility of people's security. On the basis of experience it must be stated that the responsibility in question has so far been rather weak since there is still no solution to the final disposition of a portion of the country's nuclear waste.

The only thing that has happened is that we have succeeded in transferring the responsibility. The Soviet Union will take care of nuclear waste from fuel that originated there. In spite of this, the Finns cannot completely wash their hands of even this portion since nuclear waste is a worldwide threat to the future. Finland is also contributing to this threat, and responsibility for it does not go away when the waste is transported across the border to another country.

Therefore, the least that our country can do in this situation is to work actively for a solution to the final safe disposition or treatment of nuclear waste. Finland's participation in the waste study conducted by the Swedish Atomic Energy Office and under the auspices of the OECD should be noted with interest. The purpose of the study is to determine the feasability of storing waste in granite rock.

Participation in international research work is our country's obligation. However, it is justifiable to ask whether even this is sufficiently extensive? In relation to our country's nuclear power capacity and to the years of use there is no reason to admire the speed with which we have initiated research work.

10576
CSO: 5100/2302

PLANT PREPARES FOR FIRST NUCLEAR WASTE TRANSPORT TO USSR

Helsinki UUSI SUOMI in Finnish 29 Jul 81 p 15

[Article: "Nuclear Fuel by Train to Soviet Union"]

[Text] The first shipment of used nuclear fuel from Loviisa Nuclear Power Plant will be transported to the Soviet Union at end of August. The shipment will take place in containers by a special train, which will arrive in Loviisa at the end of this week.

"The first shipment of spent nuclear fuel to be transported to the Soviet Union will contain a total of 14 tons of fuel elements, which were removed from the Loviisa I reactor in 1978 and have since been stored at the plant," state sources at Imatra Power.

Special care has been taken in the preparations for this special transport. The transporting of nuclear fuel through southeast Finland has required extensive security arrangements.

The special train procured for this shipment has been used in corresponding tasks in Bulgaria and the GDR where representatives of Imatra Power have been to familiarize themselves with it.

An Agreement in June

Imatra Power and the Soviet organization Atomenergoeksport signed an agreement last June on the return of spent nuclear fuel to the Soviet Union.

The spent nuclear fuel will be transported by rail in Soviet containers after 5 years of storage.

TVO [Industrial Power] Does Not Have an Agreement

Finland's second nuclear power corporation, Teollisuuden Voima [Industrial Power], does not have an agreement for the final disposition of spent fuel from its Olkiluoto Plant.

"Spent fuel will be stored for 10 years at Olkiluoto. Additional storage space for spent fuel will not be needed until after 1990," stated Director Esko Haapala of TVO.

According to Haapala the final disposition of spent fuel is an issue which will be gradually resolved as time goes on. This solution does not need to be made today.

"TVO can deliberate in peace as to what will be the best alternative from an engineering, economic, political, and ecological point of view," stated Haapala.

Only 3 Percent Is Nuclear Waste

According to Haapala only 3 percent is nuclear waste, 96 percent is uranium, and 1 percent plutonium.

According to Haapala the largest portion, 97 percent, can be put back into production by means of reprocessing if reprocessing turns out to be economically worthwhile.

10576
CSO: 5100/2302

POWER FIRM'S REPORT SAYS NUCLEAR PLANT HAS PAID FOR ITSELF

Helsinki HELSINGIN SANOMAT in Finnish 3 Aug 81 p 20

[Article: "Unit One of Loviisa Has Paid for Itself"]

[Text] Porvoo--In spite of operational interruptions Loviisa's first nuclear power plant has turned out to be the hen that lays golden eggs for Imatra Power. According to Imatra Power's calculations the nuclear power plant that was completed in 1977 has already paid for itself.

Last year the number one power unit at Loviisa was out of operation for 7 months. The original summer down time planned for 2 months stretched into more than 6 months when defects were discovered in the power plant's welded seams. Also the date for putting the second power plant into operation was postponed since the same spots as on the number one unit had to be inspected.

In spite of a half year of inoperation it was calculated at Imatra Power that the number one unit has already paid for itself. A comparable coal operated plant would cost 600 million markkas more per year than a nuclear powered plant. The use of oil in a power plant is three times more expensive than coal.

According to Imatra Power's calculations the fuel savings at the Loviisa Plant has paid for the plant in 3--5 years. The service life of a nuclear power plant is calculated to be 25 years so that the power plant will pay for itself several times.

Reduced Price for Loviisa Power Plant

The profitability of Imatra Power's Loviisa Power Plant is partially explained by its inexpensive purchase price. Imatra Power obtained the power plant from the Soviet Union at a reduced price since the Loviisa Nuclear Power Plant was the first one to be sold to a Western country from the Soviet Union.

Both of Loviisa's 440-MW power plants cost a total of 2 billion markkas. Teollisuuden Voima's [Industrial Power] Eurajoki 660-MW plants have already cost 4.6 billion even though construction generally took place at the same time.

The cost of disassembling a power plant must also be included in the final expenditures of a nuclear power plant. At Imatra Power it is estimated that the cost of disassembling the Loviisa Plant will be one-fifth of investment expenditures.

Also according to Imatra Power's calculations the production of electricity at a nuclear power plant costs 11 penneys/kWh. Expenditures for electricity produced in a coal power plant are 20 penneys/kWh. The cost of fuel alone at a coal power plant is more than the total expenditures of a nuclear power plant.

One-Seventh of Electric Production

This year Loviisa will produce one-seventh of the whole country's production of electric energy. Thus, Loviisa's electric production would be sufficient to provide lighting for all of Finland.

Last April the two state directed energy corporations, Imatra Power and Neste, prepared a report on nuclear power as a replacement for oil. According to the calculations the construction of a 2,000-megawatt nuclear power plant by the end of this century would save 2--3 billion markkas' worth of imported fuel annually.

A Third Nuclear Power Plant This Year

It is estimated that the share of nuclear power in the production of electricity this year in Finland will be a little less than one-third. We had the same goal last year already, but because of interruptions in operation the proportion remained at only 16 percent.

It is estimated that hydropower will be one-fourth of total production this year and oil will be used primarily only for the production of electricity for industry. The proportion of coal condensed power in electric production is estimated to be 12 percent this year.

However, oil continues to make up the largest share in energy production this year. The proportion of oil is 45 percent and the proportion of wood and peat is only 6 percent. However, Finland has been able to reduce its oil dependency at a more rapid rate than the other Western industrialized countries. For example, Sweden still produces as much energy by oil as Finland did 20 years ago when the price of oil was cheap.

However, the bill for imported energy in Finland is still one-third of the value of imports. Finland's energy consumption measured in oil is one of the world's highest or 5 tons per resident.

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CSO: 5100/2303

BRIEFS

CONCERN OVER N-WASTE TRANSPORT--The defects in the containers for transporting spent nuclear fuel have caused new problems for Imatra Power's Loviisa Nuclear Power Plant. The defects discovered in the transport containers, which arrived in Loviisa from the Soviet Union, have delayed the transfer of the containers to the nuclear power plant on the island of Hastholmen. Originally all the containers were to be at their final destination on Thursday already. However, the last container was still being inspected at Loviisa station on Thursday evening. Radioactivity was observed on the bottom surface of the containers at the railroad yard. For this reason the bottom portion had to be temporarily taped up with plastic. An attempt will be made to transport the containers to Hastholmen today. Of the four containers that arrived in Loviisa only one manifested signs of radioactivity. This container had never been used before. The intent is to transport 14 tons of spent nuclear fuel to the Soviet Union in these containers. When filled, the containers will be used to transport a little less than 70 kilos of plutonium through the City of Loviisa. Rescue operation plans have been made for the transport route between Loviisa and Vainikkala for the security of the local residents. [Text] [Helsinki HELSINGIN SANOMAT in Finnish 7 Aug 81 p 3] 10576

CSO: 5100/2302

NATION'S URANIUM FUEL SUPPLY STRATEGY DISCUSSED

Paris CEA NOTES D'INFORMATION in French Jun 81 pp 10-19

[Report presented by Valery Ziegler, assistant to the general delegate for nuclear materials, and Evelyne Bertel, engineer in the CEA's programs department, at the Franche-Comte-SFEN meeting held in Besancon on 10 June 1981]

[Excerpts] In 1980 France consumed 191.8 MTEP [Million Tons of Petroleum Equivalent]. Of this figure, 102.1 MTEP or 53.2 percent, was petroleum; electricity produced by nuclear power amounted to 57.8 TWh, equivalent to 12.9 MT [Million Tons] of petroleum; this provided 6.7 percent of our energy supply. In 1985, based on a total consumption of 219 MTEP, the amount supplied by petroleum should be down to 43 percent (93 MTEP), while nuclear power could cover 19 percent (195 TWh or 43 MTEP) of our consumption.

This means that the security of our uranium supply is one of the key points of our energy policy in both the short and mid-term period.

Nonetheless, the situation of France concerning uranium is fundamentally different from the status of our petroleum supply. While our oil reserves are insignificant, about 14 MTEP of a world total of approximately 90 GTEP, our natural uranium reserves make up 2 percent of the world reserves in the market economy. This places us eighth in the world and in first place in Europe. As for our national production, which was over 2,600 tons in 1980, this covered 77 percent of our needs and it will still provide over 50 percent of our supply in the middle of this decade.

Moreover, since natural uranium represents only about 10 percent of the cost of 1 nuclear kWh, it is evident that the bill for uranium imports should not carry the same weight as our current oil bill in France's balance of payments. Our petroleum imports, amounting to 130 billion francs in 1980, represent nearly a fourth of our imports in value.

Definition of a Supply Strategy: the French Case

General Market Context

The international market is typified by the extent of its uncertainties, especially in the long term, and the multiplicity of the possible factors which might disrupt the security of supply. But for the very short term period, the market is rather favorable to buyers because of the surplus of supply over demand.

Uranium, because of its special characteristics, has its own market mechanism. It is a mineral substance and its production is therefore subject to the constraints inherent in any mining operation, but it is also a raw material used in producing energy. This makes the problems related to its security even more acute. Its sole use now is the manufacture of fuel for nuclear reactors, but there is also no replacement product which the electricity producers can use, once a nuclear power plant is put in operation. For these reasons, we can not really speak of a free market for uranium.

But it is primarily the danger of the proliferation of atomic weapons which makes uranium a "sensitive" product whose transport between different countries of the world is subject to political restrictions, which are superimposed on the technical and economic problems. For this reason, the signing of supply contracts between Canada and the European Communities or Australia has led to lengthy discussions about respecting non-proliferation criteria. In these two instances, room for agreement was found, and everything now suggests that this trade will continue without problems. But this is unfortunately not always the case, as we find from the disputes between the United States and India or even Japan, and their impact on shipments of nuclear fuel to these two countries.

The function of price as a market regulator works rather differently in the case of uranium. Here producers and consumers are more closely bound together than in other markets, because this is a product with a single and irreplaceable use. Too great a drop in price in these conditions first hurts the consumer, for it threatens to lead to a decline in production and the abandoning of part of the uranium resources, which would be very harmful in the long run. In such a case the producer adjusts his production costs, and thus the ore content, to the sale price. When the uranium content of the ore mined is raised, this causes the irreversible loss of more marginal ore which might become quite significant in the case of a major price decline. Moreover, the prospecting effort expended by the mining companies determines the future security of supply of the electricity producers, and this is dependent on the producer making a satisfactory profit. But in the reverse case, too great a price increase would cause electricity companies to turn to other types of power plants, thus depriving uranium of any market. In France the community of interests between producer and consumer is strengthened by the structure of our highly centralized nuclear industry, and by the existence of only two national companies, COGEMA [Nuclear Materials Company] and EDF [French Electric Company]. The first handles the sale of French uranium, and the second is responsible for electricity production. Nor can we ignore, in a general analysis, the social, administrative, or environmental impact constraints which may endanger uranium supplies, at least temporarily. In the United States, where the uranium industry is most highly developed, these incidences have reached a fairly significant level. The lack of specialized labor, delays in obtaining operating permits, and increases in taxes on mining companies are all obstacles which hinder an increase in production in line with original expectations.

Almost all of the parameters which we have mentioned may cause a possible reduction in the uranium supply available, so any supply strategy has to allow an adequate safety margin in order to cope with a decrease in supply in the market. Today's uncertainties about the development of nuclear energy do not favor the establishment of a clear and stable market.

France has developed a significant nuclear power program, which will enable it in years to come to strengthen its energy independence, if it is able to guarantee for itself access to sufficient uranium resources.

France's Uranium Assets

An analysis of the general uranium supply conditions could lead a person to believe that the shift from petroleum to nuclear power means just a change in petroleum constraints to the uranium market constraints.

But in reality, the situation is fundamentally different for France, for though our country is very poor in petroleum resources, it is a rich uranium-producing area. France's uranium resources amount to 120,000 tons of known resources, according to the OECD [Organization for Economic Cooperation and Development] classification, or in terms of energy equivalance, under the present conditions of use, our uranium resources are 100 times our national petroleum resources. Our annual production, which is now seventh of the MEM [World Market Economy] with over 2,500 tons, will be able to supply over half of France's needs until the middle of this decade.

The development of our known resources is very encouraging. Between 1979 and 1981, there has been an increase of over 20,000 tons (see figure 1), to which we should add the approximately 5,000 tons produced over the past 2 years. This increase of nearly 25 percent comes largely from the Coutras deposit in the Gironde area, whose discovery was announced by COGEMA in 1980. In all, since the beginning, some 154,000 tons of uranium have been discovered in France, of which 32,500 tons have now been mined.

10^3 t U	R.A.R.	R.S.E.	TOTAL
< 80 $/kg U	39,60	26,20	65,80
80-130 $/kg U	15,70	19,65	35,35
TOTAL	55,30	45,85	101,15

– 1979 ◸
– 1981 ◢
Δ = 20,15 10^3 t U

Figure 1: France's Known Uranium Resources

Key:

1. R.A.R.= reasonably certain resources
2. R.S.E.= estimated supplemental reserves

Outside of France, particularly in French-speaking Africa, but also in Canada, Australia, the United States, and in many other countries, French mining companies are involved in prospecting and development. This provides us special access to non-French resources and furthern strengthens the security of our uranium supplies.

The search for uranium deposits has been one of the CEA's [Atomic Energy Commission] major concerns since it was created in 1945. Prospecting methods have been developed and improved for a long time now. Since 1954, the entry of private mining companies into the uranium mining industry has increased and diversified these efforts. France's interest in this work, reinforced by the 1974 energy crisis, took on concrete expression in 1977 with the establishment of a subsidy for exploration under the "Uranium Plan." Under this program, the state grants loans ranging up to 30 and sometimes even 50 percent to the projects selected; these loans are repayable only in case the prospecting is successful.

All of these activities have given France a technical and industrial infrastructure on a par with its needs. Moreover, we also maintain good relations with most of the uranium-producing nations, and have already signed a long-term purchase contract with Australia to complete our own supplies.

Present Status of the Uranium Mining Industry in France

The uranium mining industry operating within French territory and abroad is composed essentially of seven industrial groups.

a. The COGEMA is a 100-percent subsidiary of the CEA. It was founded in 1976 and dominates the sector. It operates the fields of Vendee, of la Crouzille, and of Lodeve. Its operation at Bois Noirs in the Forez has just been closed, but a new operation is scheduled for Coutras in the Gironde. In addition, the COGEMA handles the processing of the ore through the SIMC [expansion unknown], of which the COGEMA holds the majority of the stock.

b. The CMDT [Dong Trieu Mining Company] is a subsidiary of Schneider. It operates the deposit of Bernardan and the ore processing plant of Mailhac in the Massif Central, which is associated with the Bernardan deposit. It also holds a number of research permits in the Creuse region and on the Millevaches Plateau.

c. The CFM [Mokta French Company], formerly the CFMU [French Uranium Mines Company], a subsidiary of Imetal, operates the deposits in the region of Langogne in Lozere and of Hyverneresse in the Creuse.

d. The Minatome company, a 50 percent subsidiary of the CFP (French Petroleum Company] and of PUK [Pechiney-Ugine-Kuhlman], has a number of research permits. It is developing the Bertholene deposit and is working the Saint-Pierre du Cantal deposit, along with a concentration plant.

e. The CIM [Industrial and Mining Company], a 100 percent subsidiary of the Rhone-Poulenc group, has a good number of research permits and has developed the Bondons deposit in Lozere.

f. Finally, the newcomer in uranium prospecting in France is the SNEA [Elf Aquitaine National Company]. As part of its program to diversify its activities, it has rapidly become a significant part of the uranium mining industry.

	(3)EN FRANCE	(4)HORS FRANCE
(1) CUMULÉ PRÉ 1972	435	291
(2)1972	24	43
1974	72	95
1976	98	159,5
1978	155	166
1980	400	(327)

Figure 2: Spending by French Companies for Uranium Prospecting

Key:

1. cumulative
2. before 1972
3. in France
4. outside France

These groups, in association with other French and foreign companies, and with the cooperation of the authorities of the nations involved, also operate abroad. The main fields being operated by the French companies outside of France are located in Niger, Gabon, the Central African Republic, Canada, and Australia. The magnitude of the prospecting efforts of the French companies is shown by the many applications for research permits and by the amount of the expenditures made. At the end of 1980, the total area covered by permits allocated within France, including 1,250 km^2 of exploitation permits, and applications under investigation, exceeded 10,700 km^2.

Prospecting expenditures, both in France and abroad, have grown regularly since 1975 (see figure 2). The slight decline expected for 1981 manifests the reaction of the French mining companies to the current market depression, but even more it is an inevitable slowdown after the very rapid period of growth in 1979 and 1980. The state contribution to this expenditure as part of its Uranium Plan is approximately 5 to 10 percent. To place this spending in its international context, we should indicate that, for the end of the 1970s, it was about 20 percent of the total spending in the World Market Economy.

A logical outcome of the mining industry's efforts in research and development, the French production capability is now the first in Europe and sixth in the World Market Economy.

ANNÉE (1)	GWe NUC. EN SERVICE (2)	BESOINS U (3) t U	CAPACITÉS DE PRODUCTION t U (4)
1980	10	3 400	2 634 *
1981	16,5	4 400	3 700
1982	22	5 100	3 900
1983	25	5 800	3 900
1984	33	7 300	3 900
1985	38	7 800	3 900
1990	(46-66)	(6 100-9 600)	4 050

* Production.

Figure 3:

Key:

1. year
2. nuclear GWe in service
3. uranium needs: tons of uranium
4. production capacities: tons of uranium

France's production is constantly growing; it rose from about 2,100 tons in 1979 to over 2,600 tons in 1980, and it should exceed 2,800 tons in 1981.

In 1981, six concentration plants are in operation; their total nominal capacity is 3,700 tons of uranium a year (see figure 3). Three of them are controled by the COGEMA: Bessines, l'Ecarpiere, and St-Jean du Bosc, with a total capacity of 3,050 tons. The CMDT's plant at Mailhac will reach its full capacity of 500 tons a year in the first half of this decade. All these plants, except the COGEMA plant in the Herault, use the acid attack process. They produce either ammonium diuranate with 75 percent uranium or magnesium uranate, 72 percent uranium.

France's Uranium Supply Strategy

The uranium supply strategy which has been chosen by France and implemented by the COGEMA and EDF is based on four essential points:

a. a large national production;
b. establishment of French mining companies abroad;
c. signing of long-term contracts with exporting nations; and
d. the formation of a sufficient security stockpile.

France's uranium needs, which were about 3,400 tons in 1980, are going to increase rapidly with the development of its nuclear power plants in operation. On 1 January 1981 there were 23 nuclear power units installed, representing 15.6 GWe, and 29 units under construction, representing 30.2 GWe. In 1985 France's nuclear power generating capability will reach 38 GWe, and at the end of the decade it should be, depending on the government's energy policy, between 45 and 55 GWe. Along with this growth of the nuclear power generating capacity, there will be an average increase in uranium needs of 600 tons a year during the first half of the decade.

Facing this demand, the share of supply provided from French production will be declining, despite the increase in our national production capacity, which will reach 4,000 tons a year in the second half of the decade (see figure 4). This share will drop from 80 percent, as it is now, to 50 percent towards 1985, and certainly even less towards 1990. Nonetheless, France will maintain a favorable position in relation to most of the other consuming nations, outside of the United States and Canada. Moreover, there are still possibilities of finding uranium deposits in conventional sites on French territory. Additionally, geological factors indicate that there is also in France the theoretical possibility of economically recoverable ore deposits, possibly located under unproductive areas. The search for such mineral deposits implies considerable progress in our knowledge of uranium geology and prospecting. To increase our chances of success in this field, an active research and development program is now being implemented with the support of the CEA.

To complete our supply, we have removal rights with the French companies operating abroad. In Niger and in Gabon, the COGEMA is the main operator, and the favorable political and economic relations which we maintain with these French-speaking countries are a good guarantee of access to a large part of their production, which will exceed 10,000 tons a year in the second half of this decade. Starting in 1983-84, the production from the deposits held by Mokta in Saskatchewan, Canada, may be able to provide 1,000 to 1,500 additional tons to France. Minatome's development of the Ben Lomond deposit in Australia should, in the mid-term period, offer a new possibility of diversifying our supply sources.

As for true imports, the existence of a surplus on the international market until the end of the decade and even beyond will certainly help us to conclude delayed purchase contracts on satisfactory terms.

Site	(1) Société	(2) Capacité t U/An	(3) Trait.
Bessines (Hte-Vienne)	SIMO	1 500	Acide (4) DUA
Écarpière (Loire-Atl..)	SIMO	650	Acide DUA
Langogne (Lozère)	CFM	250	Acide UMA
St-Pierre (Cantal)	SCUMRA (MINATOME)	100	Acide UMA
Mailhac (Hte-Vienne)	CMDT	300 (500)	Acide UMA
St-Jean (Hérault)	COGEMA	900	Alcaline (5) UMA

Figure 4: French Uranium Concentration Plants

Key:

1. company
2. capacity (tons of uranium per year)
3. method used
4. acid
5. alkaline

A recently added supplier of uranium is Australia. The success of the negotiations involved in reaching the Franco-Australian agreement clearly shows the possibility of agreement between producers and consumers, involving mutual respect for the interests and needs of each party.

Finally, in early 1981 the French government took steps to reinforce our supply security. It was decided then that the electricity producer, EDF, and the supplier of fuel and fuel cycle services, COGEMA, should maintain permanently a strategic stockpile equivalent to 3 years of consumption by our nuclear power plants. They must also be able to face a cutoff in foreign deliveries for 5 consecutive years. This should be compared with our 3-month supply of oil. The small amount of space taken up by nuclear fuel, and especially its modest share of the total cost in the kWh produced greatly facilitate a large-scale storage policy. France is in this way able to guarantee the security of its energy supply without imbalancing its budget, which it could not do in the case of hydrcarbons or even coal, which would still cause insurmountable technical problems if large amounts were to be stored.

In the short and mid-term periods, France's uranium supply seems reasonably certain. Through a policy which has been developed and adapted over a long period of time, the problems have been resolved. The implementation of a prudent supply strategy, based on a judicious balance between the resources of our own national territory, our mining operations abroad, and the use of purchases from the international market assure us a comfortable situation at least until the end of the decade.

Still, we must not forget that the technically and economically recoverable uranium resources in the world and in France are limited, and we must use them wisely, exploiting their energy content to the utmost.

For this reason and in order to free ourselves in the long term from the constraints inherent in the gradual depletion of these natural resources, France has developed the fast neutron breeder process. The introduction of these reactors in our nuclear power generating stock will enable us to multiply by a factor of about 100 the energy content that can be recovered from uranium, thus prolonging the possible participation of fissionable nuclear energy in meeting the energy needs of France and of the world.

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 117

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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JPRS 79125

2 October 1981

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 117

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FRASER BACKS, LABOR ATTACKS U.S. ON NEUTRON BOMB DECISION

Sydney THE SYDNEY MORNING HERALD in English 11 Aug 81 p 2

[Text] **President Reagan's decision to build the neutron bomb was strongly supported yesterday by the Prime Minister, Mr Fraser, and equally strongly attacked by the Labor Party.**

The emotional climate surrounding the neutron bomb — which is designed to kill people with intense radiation, but preserve buildings — will be used by the Labor Party in coming weeks as a focus on which to hammer US and Australian nuclear strategy.

The Opposition Leader, Mr Hayden, is planning a statement on nuclear policy when Parliament resumes.

"I think many people would argue that the United States had no alternative but to make this decision," Mr Fraser said yesterday in Canberra.

"It is one that President Carter very nearly made and only drew back at the last minute.

"I think we need to understand that the Soviet Union has been spending about 14 per cent of its total income on defence for many, many years. When American defence spending went down, the Soviet Union's defence expenditure went on going up."

The Prime Minister's comments are further proof of his strong support for increased US defence spending as outlined by President Reagan and applauded by Mr Fraser during his mid-year US visit.

Labor's Foreign Affairs spokesman, the Deputy Leader, Mr Bowen, claimed yesterday that the proposed US strategy for a limited nuclear war could involve Australia through the staging of B-52 bombers through Darwin.

He said that President Reagan's decision to manufacture, and stockpile neutron bombs "dangerously encourages the false concept of limited nuclear war."

Mr Bowen said he believed such "enhanced radiation" weapons would lower the "nuclear threshold" and make a nuclear war more likely.

Mr Bowen cited evidence given last year to the US Senate Armed Services Committee, which was told that in a limited nuclear war in the Middle East atomic weapons would be flown from Guam, the mid-Pacific base.

Mr Bowen said such flights would almost certainly be staged through Darwin.

The conflict over the neutron bomb is another demonstration of the widening gulf between the Government and Labor Party over foreign policy and defence strategy. This is focused chiefly on differences over the American alliance.

Mr Fraser said yesterday he believed that a weak United States would only encourage Soviet adventurism. A strong United States would make the Soviet Union "think twice before taking the kind of actions that they did in relation to Afghanistan."

The thrust of the Labor Party position is that the United States is pursuing a dangerous course in talking of limited nuclear war and that Mr Fraser's Government has locked Australia too closely with US nuclear strategy.

The main European allies generally refrained from comment on President Reagan's decision to go ahead with the neutron bomb, calling it American business. But small NATO countries and at least one neutral country condemned the move.

CSO: 5100/7556

ACTU ANTI-URANIUM POLICY QUESTIONED, DEEMED INEFFECTIVE

Use of 'Flawed' Evidence

Canberra THE AUSTRALIAN in English 13 Aug 81 p 3

[Article by Nicholas Rothwell]

[Text] **FRESH evidence has emerged that the ACTU's opposition to uranium mining is based on flawed scientific studies, following the disclosure yesterday that the ACTU's policy documents quote findings retracted more than two years ago.**

In a study made available to *The Australian*, one of the nation's most eminent nuclear safety experts has assessed the ACTU's basic policy on uranium as "a biased and confused document."

It betrayed the influence of ideological rather than rational thinking.

The revelation that the ACTU statement on uranium contains a series of factual errors is made in a line-by-line analysis of the policy by the former head of the Australian Atomic Energy Commission's Environment and Public Health Division, Dr George Watson.

Dr Watson's critique, prepared for employees of Ranger Uranium Mines, questions the scientific accuracy of ACTU comments in presenting its findings, and claims that statements used to justify its uranium policy are "either inaccurate or misleading".

The examination by Dr Watson, a member of the Government's Ionising Radiation Advisory Council, also shows that the ACTU policy relies heavily on a set of studies from the United States which have been overwhelmingly rejected.

The main ACTU policy statement questions the safety of nuclear plants and refers to controversial studies performed by Dr Thomas Mancuso at the Hanford nuclear centre at Richland in the State of Washington.

But the ACTU does not refer to public claims by Dr Mancuso's assistants that his claims about high cancer rates among workers at the centre are "quite unwarranted".

"Although the Mancuso claims have been thoroughly refuted and are not accepted by any reputable authority, they have been taken up and used as propaganda by anti-nuclear activists," Dr Watson said.

"It is unfortunate the ACTU has been taken in by them."

The Mancuso study — which was also rejected in the World Health Organisation's latest survey of low-level radiation — claims a high cancer rate among workers at the Hanford nuclear works, and states this was caused by radiation.

Dr Watson says that after being told his contract would be terminated, Dr Mancuso sacked his assistants, and hired two others with a public record of opposition to the official safety regulations at Hanford.

"Mancuso said his services were dispensed with in order to suppress the new findings — the fact is his services were dispensed with well before he decided to find the new findings," Dr Watson said.

He describes the ACTU policy statement as "an incoherent document."

Dock vs. Mining Action

Canberra THE AUSTRALIAN in English 12 Aug 81 p 7

[Article by Ross Peake]

[Text]

ONE view abroad in the union movement is that if the ACTU was serious about stopping the export of yellowcake, it would force unionists to stop mining uranium.

It is a truism to say that such a move, in a country where unemployment is approaching half a million, would stagger unionists everywhere.

But the problems and confusion over union attitudes to the mining and export of uranium are larely the product of the ACTU.

That body has a policy of opposition to uranium mining, transport and export, specifically exempting existing operations, namely Mary Kathleen in Queensland.

The 1979 congress converted the policy into a blanket ban to include Mary K, but by then it was too late.

Yellowcake has been exported from Mary K for five years and many unionists are reluctant to stop it and thereby endanger their colleagues' jobs.

The president of the ACTU, Mr Cliff Dolan, admits the move was two years too late.

The second problem is that once the ore is mined, other unions, although ideologically opposed, are not prepared to single-handedly carry the burden of ACTU policy.

The long-established Mary Kathleen mine produces about 800 tonnes a year. The yellowcake is railed for export through Brisbane, Townsville and Sydney.

Most supplies go into Mary K by rail, including large amounts of sulphur, essential in uranium refining.

Nabarlek began production early last year and is expected to produce about 1500 tonnes a year. The product is taken by road to Darwin to be shipped.

The Australian Railways Union has been opposed to uranium mining and export since 1977.

In February this year, the ACTU called a meeting of uranium industry unions.

The Sydney meeting was told that the 50,000-strong ARU had decided to ban all uranium export shipments.

So how did a $12 million shipment leave the port of Brisbane in May?

The answer lies in that conundrum among member unions of the ACTU.

The Queensland Trades and Labor Council called a meeting of its affiliated unions to try to stop similar shipments, yet exports continue.

The ACTU has not taken into account the emotionalism attached to keeping people working in the north.

This strong sentiment was evident in a poll the Queensland Railway Station Officers Union took late last year on transporting uranium.

The result was that 58 per cent wanted to keep the yellowcake rolling. So it does.

The ARU is in much the same position, in spite of its public anti-uranium stance.

The ARU's Queensland secretary, Mr Pat Dunne, told *The Australian*: "Our members haven't stopped shipments because initially the ACTU decided to exempt the Mary Kathleen mine from any bans and the members in north Queensland feel it is a bit inappropriate to try to reimpose a ban on Mary Kathleen now.

"Mary Kathleen looks like it will just keep going until it runs out of the stuff. It would be a different situation with any new mine though."

So the miners will dig the uranium, the railway workers will freight it, and it is left to the waterside workers to act.

The official Waterside Workers Federation policy is to handle yellowcake unless other unions are prepared to observe ACTU policy. Another domino down.

The seamen's union decided in 1977 that yellowcake should not be mined, transported or exported, except for medical purposes.

When a British ship loaded seven containers of yellowcake in Brisbane in June, the seamen's union State secretary, Mr Jim Steele, promised to make the ship a monument.

After refusing for 48 hours to allow tugs to manoeuvre the vessel out to sea, the union relented.

Yesterday Mr Steele said: "We can't do much because we're tail-end Charlie."

Union sources say the ACTU will probably crack down on new mines.

CSO: 5100/7556

BRIEFS

NABARLEK URANIUM--Reporting for the 18 months to June 30 to bring its balance date into line with Pioneer Concrete, Queensland Mines' huge profit follows the start of operations at its Narbarlek uranium mine. Achieved on a 290 percent increase in turnover to $93.55 million, the profit represents earnings of $2.30 a share. Pre-tax profit totalled almost $77 million. No dividend has been declared. The final figures have been derived by valuing stocks of uranium oxide already produced at the lower of the cost price or the net realisable value. Delays to the start of work at Narbarlek during the 18 months ended June, 1980 prompted the company to fulfil its existing contracts using uranium obtained from the Commonwealth Government stockpile. The proceeds from the sales were paid to the government. The company has now returned the whole of its borrowing of uranium to the government. Sales proceeds of $63.1 million, previously paid to the government, have been included in the latest turnover figures. [Excerpts] [Brisbane THE COURIER-MAIL in English 25 Aug 81 p 27]

MARY KATHLEEN PRODUCTION--Mary Kathleen Uranium Ltd, the CRA-controlled uranium miner whose major activity is scheduled to end in 1983 due to lack of ore reserves, saw profits plunge 71 percent for the June 30 six months to $1.72 million from $6.03 million previously. Exclusing abnormal items and the offsetting reduction of the 1981 tax liability of $3.1 million to reflect adjustment of the 1980 liability largely arising from shorter mine life, net earnings for the six months would have been $2,590,000. Earnings for the six months to June 30, adjusted on the same basis, would have been $6,629,000. Interest was halved to $620,000 ($1.17 million) while depreciation was also down to $4.01 million ($4.52 million). A further loan repayment to the major shareholders of $5 million was made, leaving $5 million outstanding. Other factors affecting results were shipment delays due to Seamen's Union bans on uranium shipments, which directors estimated cost the company $600,000 since February, with the daily rate rising as stocks accumulated. Only two shipments totalling 258 tonnes of uranium oxide had been made since then, leaving 151 tonnes valued at $11.5 million expected to be awaiting shipment by September. Production rose to 395.1 tonnes, up from 367.8 tonnes in the corresponding half of 1980 despite a major industrial stoppage over the negotiation of the award. [Text] [Brisbane THE COURIER-MAIL in English 25 Aug 81 p 27]

CSO: 5100/7556

BRIEFS

RAJASTHAN NUCLEAR PLANT--About eight tonnes of heavy water out of an inventory of 210 tonnes escaped from the reactor system of unit I of the Rajasthan Atomic Power Plant (RAPP) at Rawat Bhata into a vaulp in the reactor building, Minister of State for Science and Technology and Environment C. P. N. Singh told Mr N. P. Nanda in Rajya Sabha on Thursday, reports UNI. Most of this quantity has been recovered, purified and put back into the system. The Unit I had nine outages in 1978, 14 outages in 1979 and 19 outages in 1980. These were due to equipment malfunction, grid problems and human error. [Text] [New Delhi PATRIOT in English 4 Sep 81 p 5]

CSO: 5100/7151

BRIEFS

ELECTRON ACCELERATOR FROM USSR--A microtron--an electron accelerator--has been built at the Joint Nuclear Research Institute under the supervision of Academician G. Flerov. It is intended for the Socialist Republic of Vietnam, and Vietnamese physicists and engineers took part in developing and adjusting it. The microtron will soon be shipped to Hanoi and installed at the physics institute. The new instrument, according to Academician N. Bogolyubov, director of the Joint Nuclear Research Institute, will make it possible for Vietnamese physicists to considerably expand applications of physics research in the economy. At present there are 32 Vietnamese physicists and engineers working in Dubna along with Soviet scientists and specialists from other socialist countries. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 3 Sep 81 p 4]

CSO: 5100/4540

NUCLEAR PLAN PRODUCTION EXAMINED IN DETAIL

Bratislava PRAVDA in Slovak 16 Jul 81 p 3

[Article by Anton Srdos, Chairman of the CPSL All-Construction-Site Committee of the Nuclear Power Plants in Jaslovske Bohunice; Gustav Capko, editor of RUDE PRAVO; Dusan Stancek, editor of PRAVDA: "The Nuclear Power Plant Must not Be Affected by Vacations; Fulfillment of the Task Is Realistic Despite Difficulties"]

[Text] Our first industrial nuclear power plant, V-1 in Jaslovke Bohunice, is a "child" of the last, Sixth Five-Year Plan. Although the power plant began to root its reinforced concrete on the rich soil of the Trnava plateau more than five years ago, it grew full with effective help from Soviet experts and became alive by the powerful beat of its atomic heart at the close of the past five-year plan. The power system spreads the message of peaceful and creative use of the atom, which elevates humanity and society, to all parts of our country and, through its interconnection with the Peace power system, it also brings benefit to the other CEMA countries.

The power plant generated more than 9.3 million MWh of electric power from December 1978, when the phases of the first block were connected to the network, to the end of May of this year. Let us note that in order to generate an equal amount of electric power with classic steam power stations we would consume approximately 10 million tons of industrial coal. At present, the V-1 power plant generates the cheapest power of all thermal power stations in Czechoslovakia. Because of its reliable and continuous operation, it has rightly been called the pillar of Czechoslovak power engineering.

During the Key Year[illegible]f Construction

Another construction of this nuclear power complex, the V-2 power plant, is taking form next to the operationally vital and reliably V-1 power plant. The builders want and must receive in this construction the dividends from all the experience and knowledge gained in previous years. This was confirmed by the conclusions of the all-construction-site party conference held in January of this year, from which it unequivocally follows that the builders, assemblers, technology suppliers, and others fully realize that without consistent coordination of the operations of the parties concerned and a higher level of management, they could not manage this year's tasks. This intention also brought forth many socialist pledges made by both individuals and collectives, which resulted in a joint socialist covenant being signed by all involved organizations. This year is particularly significant for the construction of the V-2 nuclear power plant. It is necessary to invest almost Kcs 2 billion in the construction and assembly work as well as in technological supplies. To keep the deadline for putting the first block of this power plant in operation depends on timely and consistent fulfillment of the tasks for this year.

To create conditions for the assembly of the 250-megapond* crane, which will be used in mounting the supersize parts of the power plant, such as the steam generators, the reactor vessel, and the like, constitutes one of the key tasks for the first half of the year. The present situation indicates that the principal supplier for the construction phase, Hydrostav Bratislava, together with suppliers of the technology phase will meet the deadline. Another significant task is to achieve a state of construction readiness for mounting the reactor vessel. In this respect the builders have encountered the chronic problem of labor-force shortage in individual professions. In May, there was a shortage of approximately 400 workers at the construction site, causing a slippage of almost three weeks in the construction schedule for the main generating block. This theme has been repeatedly dealt with by the appropriate ministries, and the adopted measures have partially relieved these problems. Despite this fact, it is impossible not to mention another serious construction problem--the chronic difficulties in the construction of the so-called "etazerkas." These are sets of equipment--guide-vane mechanisms, distributors, electric equipment for main and auxiliary structures of the power plant, and the like. As a result of delayed projects, frequent additions and changes by the final suppliers as well as other causes, a several-month shortfall arose during the construction of the "etazerkas." In the process of the nuclear power plant construction, almost every day brings new knowledge for more effective and reliable operation, which, naturally, both the design and building organizations endeavor to apply immediately in the process of construction. To eliminate the slippage to date, the builders most want to utilize their experience from joint assembly--which means that in certain central locations builders and technology assemblers will be working simultaneously. Therefore, it is necessary to organize the work in two or possibly three shifts.

Let us consider for a while the construction phase. After initial difficulties with the production of the reinforcement blocks in the East Slovakia Iron Works in Kosice, the metallurgists presented a nice promise. Originally, they had planned to supply the reinforcement blocks as late as in October of this year. Having reevaluated their capacities, they decided that the first supplies for the building site of the nuclear power plant will be sent three months earlier. The workers of the Ostrava Metallurgical Assembly Works rolled up their sleeves properly as well; it has been guaranteed that the assembly of steel structures will be completed within the deadline determined by the relevant government decision.

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* 1 Megapond = 9,806.65 Newtons

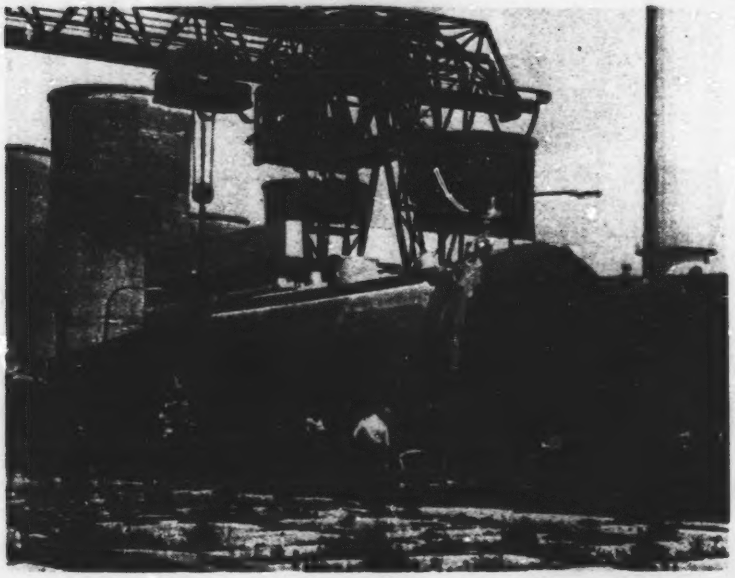
Unnecessary Worries

The builders of the technological part of the power plant had planned to make construction work worth Kcs 176 million in the first five months of this year. However, they invested only 162.5 million. On the whole, the plan had prescribed investment of Kcs 347 million during the first half of 1981. In order to honestly hold their ground in fulfilling the determined tasks even in the future, it is necessary to solve another serious problem in this area--it is constituted by the inflexibility in the drafting and approving of sale prices. The item indicators show that the principal technology supplier, Skoda Plzen, meets the delivery schedule. At present, two steam generators from Vitkovice, the K. Gottwald Iron Works and Engineering Works, are already on the construction site, and a third one should arrive shortly. Much of the equipment supplied and delivered to the construction site is quite new, the inflexible determination of the prices hampers fulfillment of the financial plan. An accelerated solution is expected especially from the FMTIR [Federal Ministry of Technological and Investment Development], however, the principal technology supplier must say his final word as must other finalists. Only in this way can a real foundation for the fulfillment of this year's objectives amounting to Kcs 1,467,000,000 crowns be created.

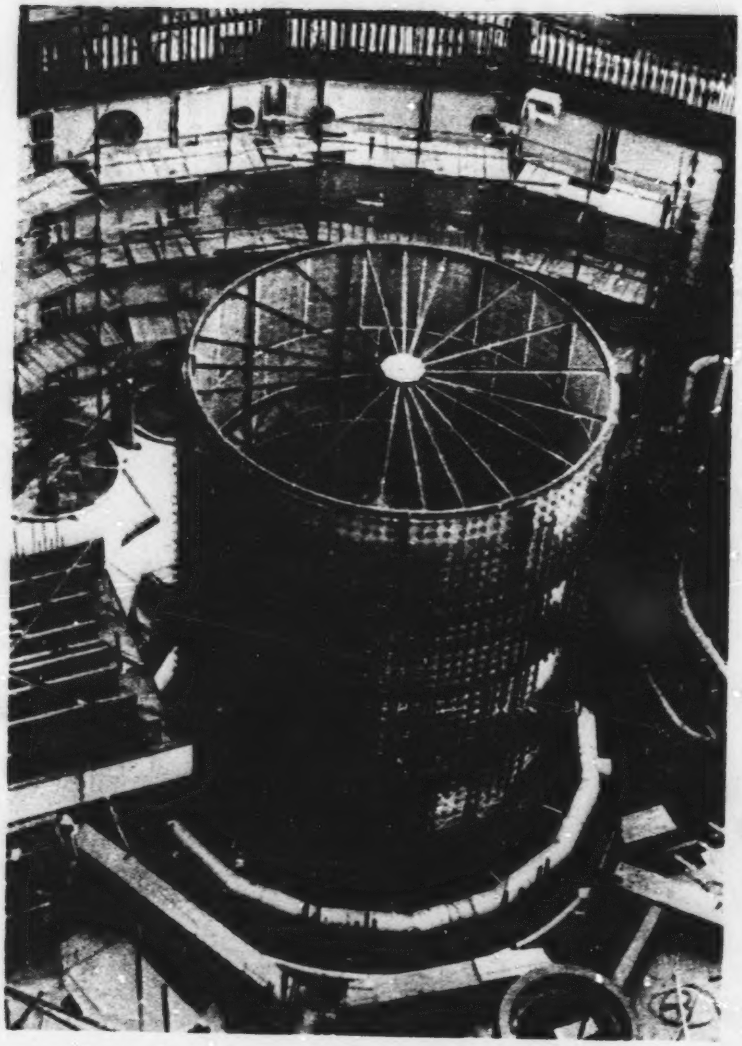
Importance of Work Organization

One of the important factors significantly affecting the progress of the construction work on the nuclear power engineering complex in Jaslovske Bothunice made so far was the initiative of the workers. Organizing the joint socialist pledges has proved to be particularly effective. The builders of the power plant have adopted such a pledge for this year, too. They evaluate the fulfillment of particular objectives regularly every month. With respect to the changes and shortfalls which occurred during the construction, the CPSL All-Construction-Site Committee together with the construction management and other institutions and organizations reevaluated in May completely the adopted pledge and defined the stipulated objectives in order to mobilize the participants in the construction to keep to their deadlines.

Summer is a period of vacations, and it is only natural that the builders, who are separated from their families for whole weeks and months, have a moral right to a deserved rest. However, the summer months also provide the most convenient conditions for fast progress in construction and assembly work. Therefore, the authorities and organizations responsible already elaborated a set of organization provisions before the coming of the summer, provisions in which they optimized the interests of the workers as well as the interests of the power plant construction which is so important from the point of view of the national economy.



Various equipment shipment deliveries arrive at the electric power plant daily. Among the largest and most fascinating are steam generators from Vitkovice.



Fascinating view of an ingenious core shaft construction of the first V-2 nuclear power plant unit.

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PHOSPHATE SEEN AS NUCLEAR FUEL SOURCE

Tel Aviv MA'ARIV in Hebrew 2 Aug 81 p 6

[Article by A. Peleg]

[Text] Phosphates in Israel will suffice to fuel two nuclear power stations according to the president of the Israeli Nuclear Science Federation, as reported in Volume 10 of the New World Encyclopedia which has just been published. This volume includes in-depth articles on engineering materials, energy, fuels, water desalination, human, nuclear and agricultural engineering.

The quantity of uranium that can be extracted from the phosphate reserves in Israel should suffice to fuel Israel's first two nuclear generators. Such is the conclusion to be drawn from the data supplied by the president of the Israeli Nuclear Science Federation, Professor Simon Yiftah, in Volume 10 of the New World Encyclopedia which appeared recently.

Professor Simon Yiftah notes that the estimate of proven phosphate reserves in Israel stands at 300 million tons at five principal sites: 'Oron, Sdeh Tzefa', Hamaxtesh Hakatan, 'Eyn Yahav and Nahal Tzin. The process which was developed and chosen for the extraction of uranium is a subprocess in the manufacture of phosphoric acid, as it is done in Florida. The mechanism at 'Arad was said to produce, at full output, 600,000 tons of rock a year, from which 166,000 tons of phosphoric oxide can be produced in the form of phosphoric acid. From this quantity it would be possible to extract, as a subprocess, 50-60 tons of uranium.

"Lately," the nuclear scientist added, "schemes have been advertised for the extraction of about 120,000 tons of phosphoric acid a year in a plant which would be set up in the Rotem plain. In parallel with exploration for the discovery of quarries and nuclear raw materials, research has also begun on another nuclear raw material--heavy water. At the Weizmann Institute processes have been developed for certain stages in its manufacture."

Professor Simon Yiftah's remarks are included in the section on nuclear engineering, in which information is presented in great detail about the essentials of nuclear technology, the world's nuclear reactors, nuclear energy in Israel, nuclear weapons and many other details concerning military and peaceful uses of the atom.

True to its special focus--the presentation of comprehensive information on science by topic--the "New World Encyclopedia" includes comprehensive up-to-date information on nuclear issues, which is also true of other sections of Volume 10--engineering materials, energy, mineral fuels, water desalination, human engineering and agricultural engineering.

Volume 11, which will appear in a few months, will complete this extensive and exclusive encyclopedia project. The New World Encyclopedia is published by MA'ARIV under the editorship of Shmu'el Shnitzer. The science editorial staff is composed of Professor Tzvi Ya'avitz, Professor Yosef Gillis, and Professor David Bachrach; [sic] and the [volume] which follows it contains and will contain comprehensive surveys of the principal branches of engineering. Experts in their fields describe in them the nature of the branches and explain the essence of knowledge and activity in each of them.

The encyclopedia is illustrated with an abundance of pictures and diagrams that bring to life the various technical subjects treated. The reader will find in its columns much more than might be expected, thanks to the breadth and depth of the material included in it.

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CSO: 5100/4746

PRELIMINARY STUDY OF NUCLEAR ENERGY PLANT FEASIBILITY NOW UNDERWAY

Amman AL-DUSTUR in Arabic 19 Jul 81 p 6

[Report on interview with Mr 'Ali al-Murr, Engineer at the Nuclear Energy Department by AL-DUSTUR: "Will Jordan Enter the Nuclear Era? Industrial Countries Oppose the Development of Nuclear Industry in the Developing Countries To Keep Those Countries Economic Dependency;" date and place not specified.]

[Excerpts] Jordan has taken positive steps to utilize its natural resources. It signed, for example, three agreements to put into use oil-bearing rocks for the purpose of generating electricity. Today Jordan is taking yet another step into the nuclear field, for researchers are initiating preliminary studies concerning the possibility of producing electricity from nuclear plants.

AL-DUSTUR met with Mr al-Murr to discuss the nuclear issue.

The Economic Advantage of Nuclear Plants

Mr al-Murr said that significant reliance on the price of energy per unit (kilowatt hour) produced at plants using oil or coal subjects that price to changes in the international markets. It also subjects it to increases in the price of fuels used at those plants. However, the price of fuels at nuclear plants is not prone to rapid increases. He added that in conventional plants, the proportion of fuel cost in determining the price of the energy produced is seven times larger than in a nuclear plant. This is because on one hand the price of oil doubled in 1979 while the price of uranium only increased 9 percent; and on the other hand, splitting 1 kilogram of uranium is equal to burning 3.5 million kilograms of coal.

Mr al-Murr pointed out that in coming years the demand for oil will increase not only because it is a source of energy but also because of its use in many products such as fertilizers, plastics, industrial rubber, food and insecticides.

In his work "Energy and Nuclear Preference," Mr al-Murr explained that reliance on nuclear energy is economically very advantageous despite the fact that building nuclear plants costs four times more than the cost of building steam plants using coal or oil. He continued, to build two plants at a capacity of 600 megawatts each, one conventional and the other nuclear, the cost of the latter is 153 million dinars more than the cost of the former. This difference can be recovered through savings on the cost of uranium consumed at the nuclear plant. Concerning reliance on nuclear plants to produce electricity, Mr al-Murr continued his talk by saying that within 25 years the total cost of consumption of fuels at a plant using oil would be 23,599 million dinars, while it would be 641 million annually at a nuclear plant. This shows that 22,958 million dinars could be saved when the price of oil increases 20 percent. Saving at the nuclear plant could still be 4,276 million dinars during the same period even if both oil and uranium increased at 10 percent.

Nuclear Energy in Jordan

Mr al-Murr called for the use of nuclear energy in Jordan to produce electricity. He argued that using nuclear energy is the best option for economic and health reasons. In addition, using it may help save oil that could be used in more important industries. Mr al-Murr said we should enter the nuclear era for two reasons:

So far, nuclear energy is the only practical alternative.

Any delay in construction will waste money and delay staff training and preparation of the administrators needed for the future production of energy and related industries.

Problems

Mr al-Murr said that there are four problems that face a country like Jordan when building nuclear plants:

1. The small number of inhabitants; the number of inhabitants determines the size of the plant. The smaller the plant, the more costly its production.

2. Lack of technology and know-how.

3. Lack of capital.

4. Neighboring Israel; as the number one enemy of the Arab nation, Israel does not hesitate to destroy important economic projects.

Joint nuclear plants: Mr al-Murr said that the best way to remedy insufficient population is to have neighboring Arab countries jointly build large nuclear plants.

Saving 300 million dinars: As for the needed capital, it is necessary to invest inside and outside the country to make the 300 million dinars needed at present to build a nuclear plant. He added that building now is a good investment because the cost will double by the end of the century.

He called for acquiring the necessary skills as soon as possible. Training 1,000 employees in the engineering, technical, scientific and administrative fields takes from 5 to 10 years. He said that 400 to 600 employees should be recruited for the plant itself and for the research center, which should be built a few years earlier than the plant. The rest of the employees should be assigned to universities and industrial, health and civil defense centers. It is possible to recruit people from the Jordanian Department of Electricity and related institutions for training in the nuclear energy production field. Mr al-Murr continued his talk by saying that training may be done with the help of specialized local universities, contractors, consultants, the companies building the plant, the International Nuclear Energy Agency and other international organizations.

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CSO: 5100/4745

DEVELOPMENT OF NUCLEAR POWER DISCUSSED

Damascus AL-BA'TH in Arabic 23 Jun 81 p 9

[Article by Badi' al-Daqqaq: "On Peripheries of First Nuclear Power Conference; Will Arabs Enter Nuclear Age Before Departing From Oil Age; Syria Builds First Nuclear Power Plant"]

[Text] Before talking about the Syrian Arab project to set up the first nuclear plant to generate electricity in the country, about the economic and technical capabilities available in this sphere and about the efforts exerted to coordinate and integrate developments in the electro-nuclear sphere in implementation of the economic resolutions adopted by the seventh regional congress of the Socialist Arab Ba'th Party--I must recount some preliminary details concerning the first Arab nuclear power conference held in Damascus last week.

On the initiative and under the auspices of the Ministry of Electricity, Damascus embraced the first Arab nuclear power conference in the period from 15-19 June 1981. The representatives of more than 40 Arab and foreign countries and organizations took part in the conference with the aim of discussing the most successful and most economic means to generate electricity from alternative sources, led by nuclear power.

Studies and research at a high level of scientific importance were presented to the conference and covered numerous aspects of the exploitation of nuclear power, including technical, economic, technological, training, administrative and health aspects at the level of the country, the Arab homeland and the world. I will mention here in particular the following among the local studies presented to the conference: Placement of Nuclear Power Plants in the Syrian Arab Republic, by Minister of Electricity Dr Ahmad 'Umar Yusuf; Comparative Economics of A Nuclear Power Plant in the Syrian Arab Republic, by Dr Nassar Sulayman Haydar; Effect of Linkage of Nuclear Power Plants on the Syrian Arab Republic's Electricity Network, by Dr Samih al-Jabi; Role of Syrian Arab Universities in Curricula Concerning Nuclear Sciences and Engineering, by Dr Hasan Kunaysh; Phosphate Industry in Syrian Arab Republic and Possibility of Extraction of Uranium, by Dr Muhammad Sha'ban Najib. All these studies, along with others, were presented to the conference in English.

To What Degree Do We Need to Exploit Nuclear Power in the Arab Homeland?

Some people may imagine that we in the Arab world are in lesser need than others for nuclear power because of the availability of oil in most of the Arab countries. The truth is exactly the opposite. We are in the direst need to utilize the alternative energy resources, led by the nuclear energy, for various reasons and factors, including for example:

Replacing oil by nuclear energy for generating electricity, for heating and for other thermal applications is considered tantamount to preserving the greatest national wealth in the Arab homeland.

The Arab world's need for nuclear power and for water fit for irrigation and heating [sic] will rise greatly in the future. The nuclear projects are capable of securing all these needs.

The Arab world possesses not only oil but also the uranium necessary for nuclear power. The Arab world abounds with phosphate which contains radioactive substances. The Arab world's uranium reserves, including the uranium accompanying the Arab phosphate, are estimated at 5 million tons.

The Arab world possesses enormous financial revenues and it contains a number of capabilities that can be utilized under conditions of cooperative joint action to utilize nuclear power.

The developing countries generally are faced with major political and technological difficulties when they try to utilize (nuclear) energy in their lands. At present, the Arab countries can overcome some of these difficulties by bargaining over the oil which they possess so as to somewhat link the exportation of oil with the development of nuclear power. This must be done before it is too late because it is expected that the intensity of the monopolistic and political pressures will rise, especially with the approaching oil-depletion date. Perhaps the first Arab nuclear power conference will take note of the above and will constitute a starting point for the release of the joint Arab efforts to exploit nuclear power in the Arab homeland.

First Nuclear Plant to Generate Electricity in Country:

In the third phase of this study, we will discuss the Syrian Arab plan to set up the first nuclear plant to generate electricity and will, to start with, pose these questions:

What are the economic justifications for setting up such a plant? What are the capabilities available for the implementation of such a project? What are the steps completed so far? Before answering these questions, it must be said that this project has been recommended by the highest authority in the country. The seventh regional congress of the Socialist Arab Ba'th Party devoted special economic attention to the issue of nuclear power and approved a number of important recommendations concerning this issue.

Why Are We in Need of a Nuclear Plant?

It is well-known that the definite oil reserves of Syria are estimated at 289 million cubic meters of which we consume, according to the current rate, nearly 5 million cubic meters annually. On the basis of the current consumption increase rate, estimated at 1.25 million cubic meters [annually], we will consume all our oil reserves in less than a quarter century. The picture becomes more pessimistic when we take into consideration the possibility of exportation which may be imposed by the economic situation and by the development programs.

This is insofar as the oil situation is concerned. What about the electric power situation?

The statistics gathered between 1974 and 1980 indicate that the average annual increase in Syrian electricity consumption amounts to 21 percent. This average is very high when compared with other countries. It is expected that the annual electric power consumption in the country will amount this year to 4.2 billion kilowatt-hours. If we assume that the average annual increase [in consumption] will maintain the same current rate in the next 10 years, the electric power needed in 1991 will amount to 28 billion kilowatt-hours.

Considering that the power available at present and expected after putting the Damascus and Baniyas plants into operation will amount to 8 billion kilowatt-hours, we will need to construct in 1991 other power plants to produce 20 billion killowatt-hours. We should keep in mind that the power that can be made available through the unexploited hydraulic resources doesn't exceed 2.15 billion kilowatt-hours. As for energy produced by oil, it is expected that oil production and consumption will be equal in 1985 if no new oil finds are discovered. Further it is expected that the country will need to import oil from abroad to meet its immediate needs on the one hand and to operate the thermal electricity plants on the other hand.

Therefore, the need for the presence of nuclear plants will become essential as of 1985, i.e., when oil production and oil consumption in Syria will become equal. In view of the fact that conducting the studies on and implementing a nuclear plant requires no less than 10 years, it is practically impossible to build a nuclear power plant in the country before 1991, the year proposed for the completion of the first nuclear plant.

Do We Have Resources to Build Such a Plant?

There is a study by Dr Hasan Kunaysh which he previously prepared for the Syrian energy conference held in Damascus in 1979 and in which the researcher answers this raised question. Dr Kunaysh sums up the requirements of building an electro-nuclear plant in the country. We will mention here some of these requirements:

--The country's electricity consumption should be able to absorb the entire basic-load production capacity (minimum production) of the nuclear power plant because changing the level of the plant capacity would be serious and undesirable technically and economically.

--The availability of an enormous capital to invest in the project.

--The availability of a minimum of local expertise.

--The possibility of implementing the project on terms that guarantee its continued production and continued supply of the fuel necessary.

The researcher believes that the country can opt for a plant with the right capacity--a plant whose entire basic-load production the country can consume. As for securing the funds needed for the project, a proper and timed economic plan must be drawn up. The researcher believes that the country can shoulder the costs of the plant's nuclear power production because generating electricity from nuclear power is less expensive than generating it from oil, on the basis of the current prices.

As for local expertise, the Syrian Arab region has some specialists in most spheres and these specialists are capable of shouldering some of the responsibilities of a nuclear program either immediately or after a short training. As for the last requirement [stated above], it is possible for the contract to stipulate that the firms which will build the plant get a commitment from the party selling or exporting [the plant] to advance technical aid when necessary and to manufacture the fuel throughout the plant's lifespan.

Another study, entitled "Comparative Economics of A Nuclear Power Plant in the Syrian Arab Region" and presented to the Arab nuclear power conference by Dr Nassar Sulayman Haydar, proves that the technical and economic conditions in Syria are suitable for building one of the commercially available types of power plants with a capacity of about 600 megawatts.

The researcher has reached his conclusion by studying the economic situation of power generation in the country in the next 20 years, by comparing the prices of electricity produced by nuclear power plants with the prices of electricity produced by oil-operated plants (fuel oil) and by noting the expected changes in oil prices and the fixed annual price rate of both kinds of electricity generating plants.

Because the preparation for building a nuclear plant, including the technical and economic studies and training the cadres, requires 10 years as a minimum, the researcher recommends speeding up the implementation of this project to benefit from the superior economics of nuclear power as soon as possible.

Have We Actually Begun to Implement Nuclear Plant Project?

Dr Ahmad 'Umar Yusuf, the minister of electricity, said in an interview I had with him during the convocation of the nuclear power conference?

We started two years ago to prepare for the first phase of implementing the plant project. We have prepared the initial studies and we have sought international bids to advance consulting services on the use of nuclear power to generate electricity in the country. We have chosen the best four offers from among 40 international offers made by the biggest consulting firms in the world. The higher authorities will select the suitable offer. The minister believes that the theoretical and field studies on the project, including the location of the plant and the selection of the best kind of reactors and of the type of nuclear fuel, require two years whereas construction of the plant needs eight years at the average. This means that construction of the plant will be completed in 1991.

8494
CSO: 5100-4734

FIRST NUCLEAR ENERGY PLANT IN COUNTRY DESCRIBED

Havana JUVENTUD TECNICA in Spanish Apr 81 pp 14-21

[Article by Lucy Gispert: "The First Nuclear Electric Power Plant"]

[Text] Cuba's first nuclear electric power plant rises on the shores of the Caribbean Sea in the southwest section of the City of Cienfuegos thanks to a cooperation agreement signed by Cuba and the Soviet Union.

Before that, during the decade of the seventies, the country had received technical aid which included a subcritical uranium-water reactor for experimental and training purposes plus a set of fuel elements, equipment items, devices, and materials for the purpose of organizing the Physics and Radiation Chemistry (radio isotopes) Laboratory.

Parallel to that the Nuclear Physics Institute was opened with modern equipment for scientific studies aimed at training high-level cadres.

The Cienfuegos Power Plant is designed along the lines of the general national electric power development plan leading up to the year 1990. For this purpose, we have been working on plans for outside and inside roads, mooring facilities for unloading heavy equipment and for the transportation of equipment and personnel. The fact that the region of Juragua was chosen--where work is being done on the construction of the CEN (Nuclear Electric Power Plant)--is due to a very careful study of the site and the weather conditions.

On the other hand we must take into account the electric energy supplies service strategy which calls for the construction of other power plants.

This long-range project is being studied with a view to the placement of a CEN in Holguin as soon as the Cienfuegos Power Plant has been completed.

The Cienfuegos Power Plant includes two new units which are to start operating at the end of the next 5-year period with capacities of approximately 400 Mw, which will increase the national system to 800 Mw.

Current and Future Needs

The use of nuclear energy is destined to occupy a key position in the not too distant future. The latest estimates prepared by the IAEA show that 15 percent of the electric power output worldwide will be generated in nuclear electric power plants in the year 2000.

According to these estimates, 400 reactors will go into operation in 1980 and 26 countries will be using that type of energy.

The main sources available today are organic fuel, in other words, petroleum, as well as gas and coal. Besides, water power has been used on a large scale but both of these types of sources are destined to run out while the demand keeps going up.

Cuba's particular situation in this respect looks rather somber since the hydrocarbon supply sources are at enormous distances; we do not have any reserves of our own and water power reserves are insufficient for use in generating electricity.

This paradox makes us think that the real possibility of using an abundant and more economical fuel resides in nuclear energy.

Human and Environmental Safety

The increase in the number of electric nuclear power plants worldwide implies tremendous requirements regarding operational reliability.

The protection of personnel working in those plants, the protection of population centers surrounding them, as well as the flora, the fauna, the water and the air against ionizing radiation--these are fundamental factors because the reactor is a potential source of radioactive products.

This is why the measures which are being taken from the very beginning of the use of nuclear energy constitute some of the most widely discussed problems in countries where nuclear power plants are being planned and built.

In the description on the operation of a reactor, in the attached diagram, we detail some of the mechanisms designed to prevent accidents.

In-Depth Defense

In the plan for a CEN, we invariably introduce several protective barriers along the possible fission product escape routes. Forming a part of the technological system we have the jacket that covers the fuel element; the closed cooling circuit and the hermetic reactor building, also called the containment area.

The basic principle behind in-depth defense practically reduces the probability of the escape of radioactive products to a very low level since, as we have seen, several echeloned systems are used.

First of all, the reactor shutdown mechanism rapidly stops the reactor's operation if there are any impermissible variations in the established parameters.

In second place, cooling of the active zone is continued when there are any major coolant losses.

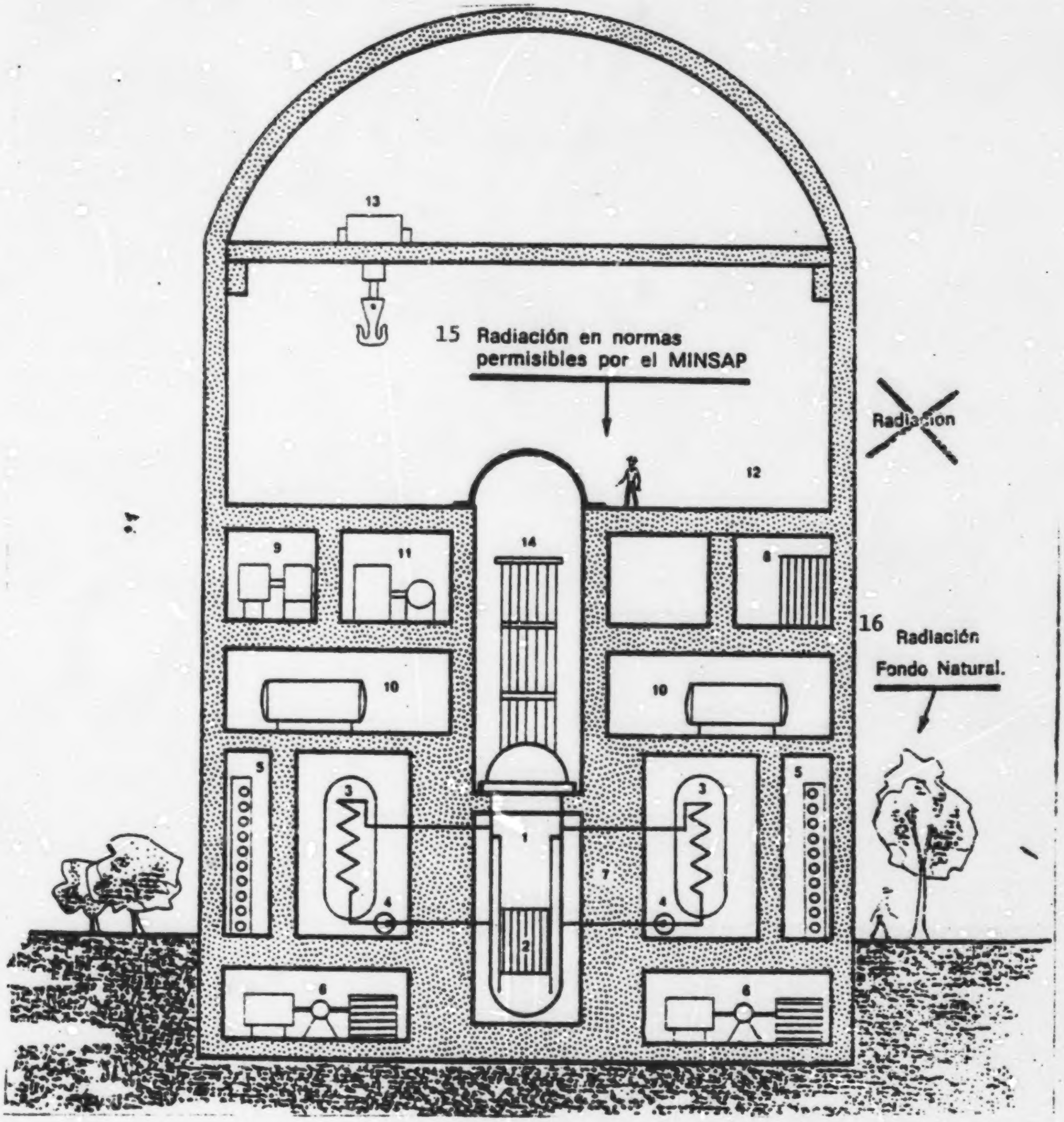
Likewise, there are reliable systems which guarantee electric power supply to other auxiliary components of the reactor and which limit the possibilities of having radioactive products escape to the outside.

The reason for all of these controls is based on the idea of preventing the consequences of "worst-case accidents"--in other words, the most serious damage that could occur. That would involve rupture in the pipes of a circulation loop.

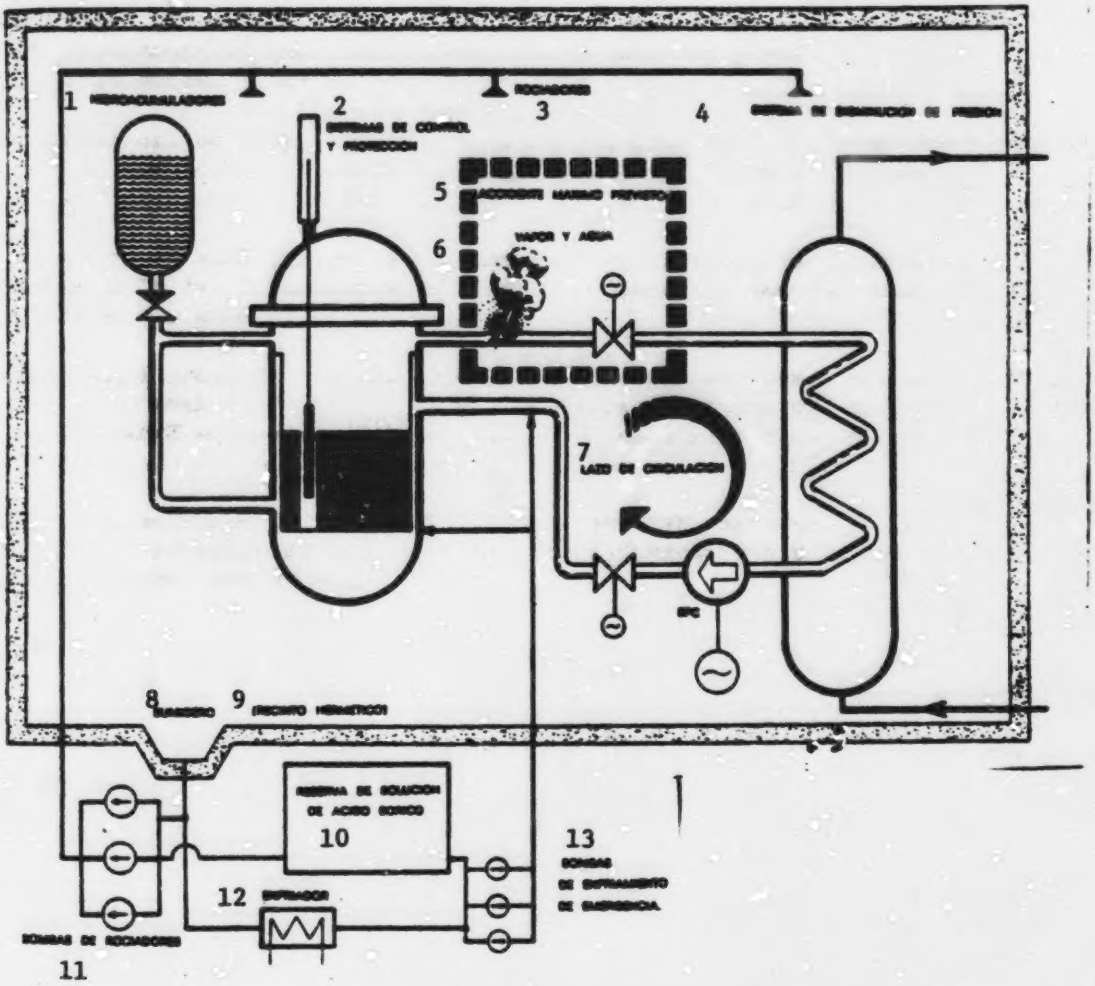
The probability of such damage, according to calculations, is extremely small, on the order of 10^{-6} for a reactor which has been operating for one year. So far, no such situation has ever arisen.

Strict personnel controls are instituted in thermonuclear power plants currently in operation. The work stations and the surrounding areas are so designed as to make sure that the work equipment will not absorb doses higher than the permissible limits established in the international standards and regulations.

Other positive measures include the design of special clothing, periodic medical examinations, limitation of time during which individuals can remain in places exposed to radiation, and others.


13
15 Radiación en normas permisibles por el MINSAP
Radiación
12
9
11
14
8
16 Radiación Fondo Natural.
10
10
5
3
1
7
4
2
6
3
4
5
6

Simplified profile drawing of reactor building at PWR thermonuclear power plant. Key: 1--Reactor; 2--Active reactor zone; 3--Steam generator; 4--Main circulation pump; 5--Coolant cleaning system; 6--Safety system; 7--Reactor casing (concrete) (2-2.5 m); 8--Fresh fuel storage; 9--Ventilation systems; 10--Reserve water tanks; 11--Waste treatment systems; 12--Central room of reactor building; 13--Main crane; 14--Reactor control and protection system; 15--Radiation in the form of norms permitted by the MINSAP [Ministry of Public Health]; 16--Natural background radiation.


1 HIDROACUMULADORES
2 SISTEMAS DE CONTROL Y PROTECCION
ROCIADORES
3
4 SISTEMA DE DISMINUCION DE PRESION
5 ACCIDENTE MAXIMO PREVISTO
6 VAPOR Y AGUA
7 LAZO DE CIRCULACION
8 SUMIDERO
9 (RECINTO HERMETICO)
RESERVA DE SOLUCION DE ACIDO BORICO
10
11 BOMBAS DE ROCIADORES
12 ENFRIADOR
13 BOMBAS DE ENFRIAMIENTO DE EMERGENCIA

Technology selected for Cuban power plant proves to be the safest of all built so far. Safety systems in thermonuclear power plants with PWR-type reactor. Key: 1--Water tanks; 2--Control and protection systems; 3--Sprinklers; 4--Pressure reduction system; 5--Maximum anticipated accident [worst-case accident]; 6--Steam and water; 7--Circulation loop; 8--Sump; 9--Hermetic enclosure; 10--Boric acid solution reserve; 11--Sprinkler pumps; 12--Cooler [coolant]; 13--Emergency cooling pumps.

Holguin will be the province to benefit from the second thermonuclear power plant over the next several years.

Location of CEN

The correct placement of a power plant is an important factor from the viewpoint of protection in general.

The hydrogeological conditions, the meteorological factors influencing the spread of gases and radioactive aerosols into the atmosphere, the population density and distribution in the surrounding areas, and many other elements must be considered before deciding on the location of a plant for the purpose of reducing the risks of harmful effects as much as possible.

All controls necessary for adequate radiological protection must be taken into account in the initial blueprint and this means that this type of power generating station is even less harmful than the conventional (thermoelectric) power plants whose discharge of gases into the environment has a contaminating effect. On the other hand, the CEN do not cause any unpleasant gases, such as they result from the combustion of petroleum.

In every nuclear electric power plant there is also provided an installation of control stations in an area within a radius of several kilometers for the purpose of checking on the status of the surrounding environment, including crops, fauna, food products, water, and of course human beings.

A Question of Government

Since the construction of nuclear electric power plants in the socialist countries is a government problem which benefits society as a whole and not certain commercial groups, the government intervenes directly in the plans and in the development of these power generating plants, thus avoiding accidents, as in Pennsylvania due to technological design errors and the lack of scruples in detecting the danger of an accident.

What happend at Three Mile Island would not be possible in a society where the means of production are not in the hands of big business operators or individual stockholders. On the contrary, the norms and regulations, as well as control over blueprints and construction in the socialist area demonstrated that nuclear atomic energy can be used on a large scale without any danger to man and his environment.

PWR-440 Reactors

Ever since the Soviet Union launched its first thermonuclear power plant in 1954, a reactor construction program has been developed widely; these reactors include various types, such as the AMB reactors which are moderated by graphite and which are cooled by water. This type is used in the power plants at Byeloyarsk and Leningrad.

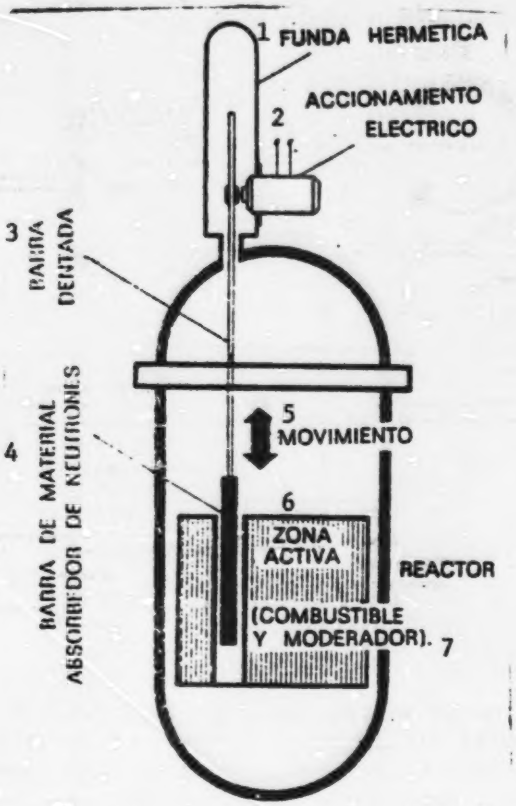
Other models, the PWR-440 models, which are moderated and cooled by water under pressure, are in operation in Novovoronezh and Kola. The latter are considered better because of their economical utilization in electric power grids.

The project now under construction in Cuba is based on a PWR-type reactor design. This reactor has the shape of a verticle cylinder with a spherical top. It has a height of 24.0 m and a diameter of 4.3 m.

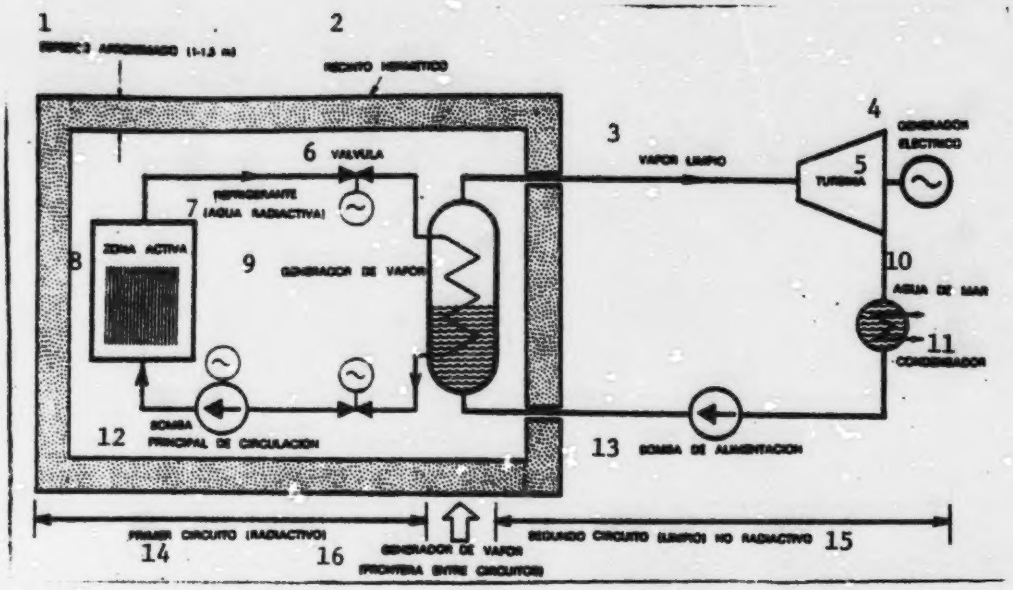
The reactor vessel is made of a forged and welded shell with an elliptical bottom. The vessel material is carbon steel with a high elastic limit. Two lines of pipes with a diameter of 500 mm permit the entry and discharge of the coolant.

Inside the vessel we have a cylindrical jacket adjusted in the upper part to separate the incoming and outgoing flow.

At the bottom of the jacket we have the pipes which protect the regulation members and the shock absorbers for the drop of those members. Next to the [radio] active zone and the jacket there is a thermal screen which reduces the neutron flow to the walls. Inside the jacket we have the basket which supports the active zone. This zone (2.88 m diameter and 2.5 m high) is made of 349 fuel elements (uranium dioxide with a density of 10 g/cm^2) forming a hexagonal net with a mesh of 147 mm.


1 FUNDA HERMETICA
2 ACCIONAMIENTO ELECTRICO
3 BARRA DENTADA
4 BARRA DE MATERIAL ABSORBEDOR DE NEUTRONES
5 MOVIMIENTO
6 ZONA ACTIVA
REACTOR
(COMBUSTIBLE Y MODERADOR). 7

Simplified diagram of reactor control and protection system. Key: 1--Hermetic casing; 2--Electrical operation; 3--Dented bar; 4--Bar of neutron absorbing material; 5--Movement; 6--Active zone; 7--Fuel and moderator.


1
ESPESOR APROXIMADO (1-1,5 m)
2
RECINTO HERMETICO
6 VALVULA
7 REFRIGERANTE (AGUA RADIACTIVA)
8 ZONA ACTIVA
9 GENERADOR DE VAPOR
12 BOMBA PRINCIPAL DE CIRCULACION
3 VAPOR LIMPIO
4 GENERADOR ELECTRICO
5 TURBINA
10 AGUA DE MAR
11 CONDENSADOR
13 BOMBA DE ALIMENTACION
PRIMER CIRCUITO (RADIACTIVO) 14
16 GENERADOR DE VAPOR (FRONTERA ENTRE CIRCUITOS)
SEGUNDO CIRCUITO (LIMPIO) NO RADIACTIVO 15

Simplified engineering diagram of CEN with PWR-type reactor. Key; 1--Approximate thickness (1-1.5 m) ; 2--Hermetic enclosure; 3--Clean steam; 4--Electric generator; 5--Turbine; 6--Valve; 7--Coolant (radioactive water); 8--Active zone; 9--Steam generator; 10--Ocean water; 11--Condenser; 12--Main circulation pump; 13--Feed pump; 14--First (radioactive) circuit; 15--Second (clean) nonradioactive circuit; 16--Steam generator (dividing line between circuits).

5058
CSO:5100/2323

NUCLEAR PLANT FAILURE FORCES EMERGENCY COOL-DOWN

Helsinki HELSINGIN SANOMAT in Finnish 2 Sep 81 pp 3, 11

> [Text] Automatic control failed, pump stopped, valve remained open.

Loviisa (HS) — On Tuesday morning there was an operational breakdown at the Loviisa 2 plant that led to the emergency cooling system pumps' being set in motion. The emergency cooling system pumped borated water, which slows down the nuclear reaction, into the reactor, which had by then already been out of operation for about 30 seconds.

This breakdown is the most serious one that has happened at the Loviisa plant. "Internationally speaking, cutting in the emergency cooling system is, however, not a rare occurrence," said Tapio Eurola, the head of the Radiation Safety Institute's Reactor Safety Department.

Eurola regards the situation that arose at Loviisa 2 as being rather of technical interest than dangerous. "Even if the state of affairs had continued for a while, in my opinion it would not have resulted in any particular danger. The plant is secure and the staff was on hand, deliberating the matter."

At First an Ordinary Breakdown

The incident began at 0706 hours. One of the six main rotary pumps automatically stopped when a safety device measurement indicated that the pump had been running at too high a temperature. As a result, there was a short circuit in the reactor, which in addition stopped four new rotary pumps.

The turbines also shorted out and the steam that drives them was automatically shunted past the turbines to the condenser.

"So far everything went off as usual in the case of an ordinary breakdown," Eurola said.

But then one of the valves in the steam lines that bypass the turbines did not automatically close. Within 7 minutes the plant's pressure and temperature readings dropped so low that the automatic emergency cooling system cut in and began to pump emergency cooling water at room temperature into the reactor.

Valve Closed by Hand

The emergency cooling water did not, however, noticeably affect reactor temperature. The valve that had remained open was closed by hand following prompt action [by plant personnel].

After the situation was brought under control, reactor temperature dropped from 280 degress to about 220 in a short time. The drop in temperature was not due to the emergency cool-down, but to the fact that the open valve caused the pressure in the turbine to drop.

The water pressure that drives the turbines dropped from 44 bars to about 20.

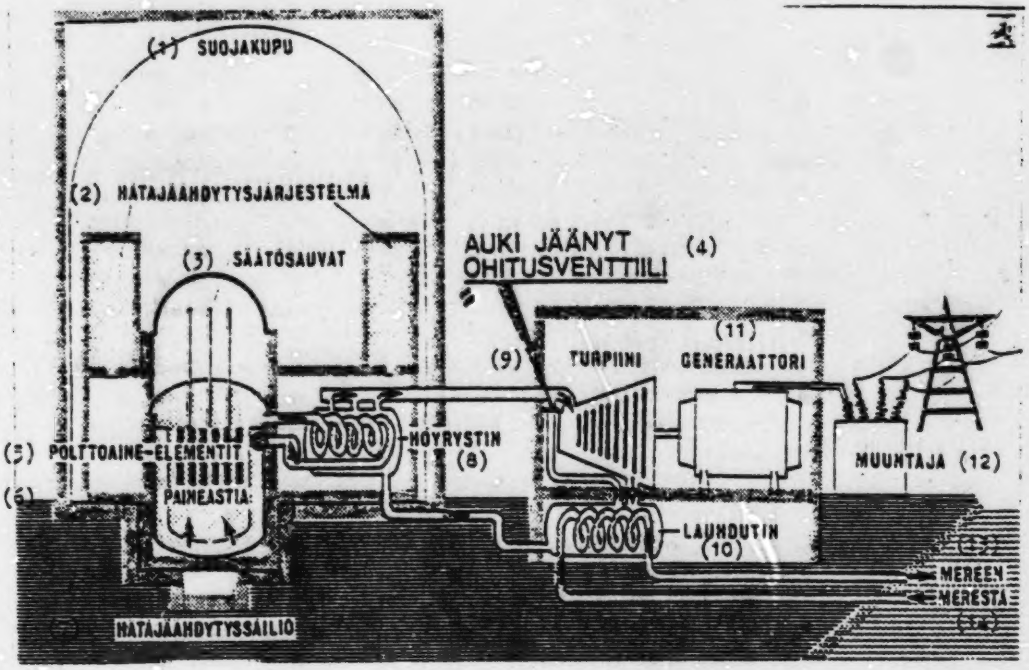
"The reasons for the breakdown and the effects thereof are being investigated at the present time," operations chief Anders Palmgren said.

The questions to be answered are above all why the open valve malfunctioned and how quickly the drop in temperature affected the reactor.

Limited Number of Rapid Deviations Allowed

During its entire operational life a reactor is allowed about 10 rapid deviations. According to Imatran Voima [Imatra Power Company], this deviation represents only one-tenth of the upper limit allowed at any one time.

During the investigation on Tuesday, it was discovered that the stoppage of the main rotary pump was caused by a defect in the automatic safety device. The device, which keeps watch over the temperature of the pump, mistakenly reported that the pump had overheated, whereby it stopped running.


(1) SUOJAKUPU
(2) HÄTÄJÄÄHDYTYSJÄRJESTELMÄ
(3) SÄÄTÖSAUVAT
AUKI JÄÄNYT OHITUSVENTTIILI (4)
(5) POLTTOAINE-ELEMENTIT
(6)
PAINEASTIA
HÄTÄJÄÄHDYTYSSÄILIÖ
HÖYRYSTIN (8)
(9) TURPIINI
(11) GENERAATTORI
LAUHDUTIN (10)
MUUNTAJA (12)
(13)
MEREEN
MERESTÄ
(14)

The valve that remained open, causing the emergency cooling system to operate at the Loviisa 2 plant is located in the turbine bypass line on the turbine housing side.

Key:

1. Protective dome.
2. Emergency cooling system.
3. Control rods.
4. Bypass valve that remained open.
5. Fuel elements.
6. Pressure vessel.
7. Emergency cooling tank.
8. Heat exchanger.
9. Turbine.
10. Condenser.
11. Generator.
12. Transformer.
13. To the sea.
14. From the sea.

RC 52
HITAUSLUPI

The bypass valve located in the Loviisa 2 plant's turbine housing did not close in response to the automatic command. Process operator Pekka Pyykonen shows where the valve is located.

11,466
CSO: 5100/2318

END

JPRS 79197

13 October 1981

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 118

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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JPRS 79197

13 October 1981

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 118

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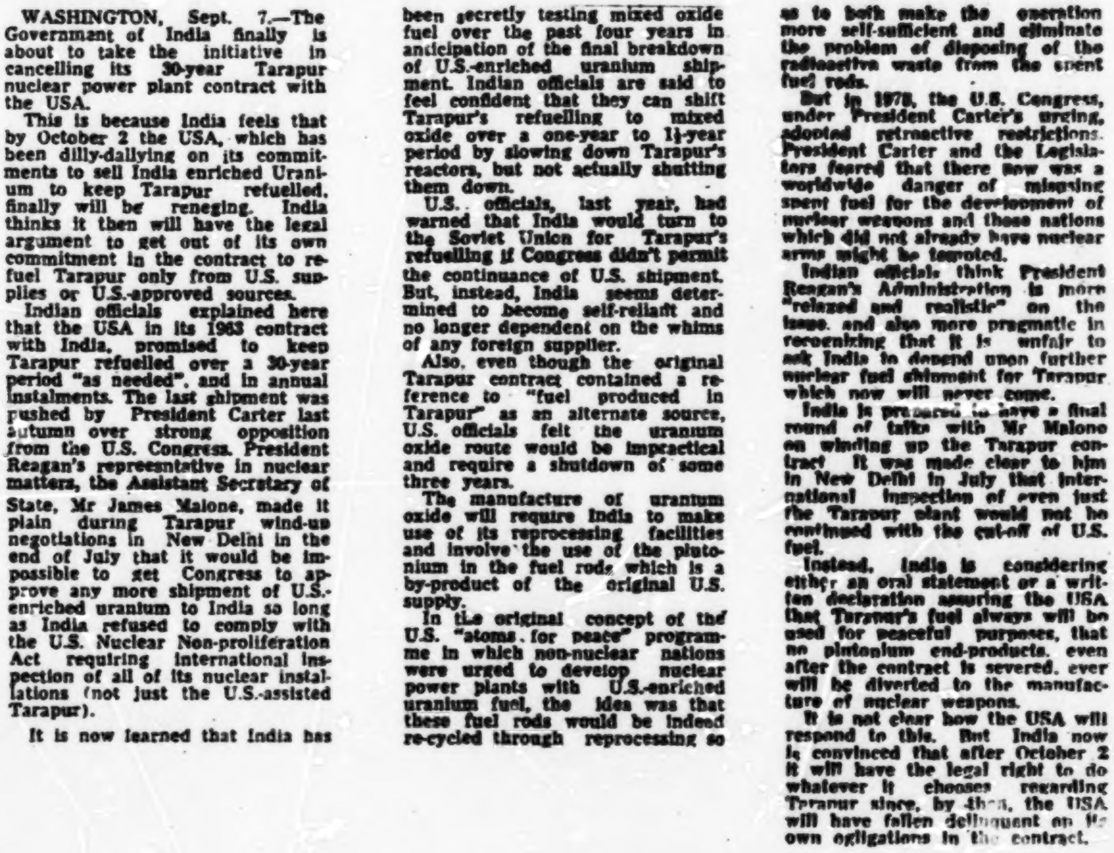
CORRESPONDENT REPORTS INDIA TO CANCEL TARAPUR PACT

Calcutta THE STATESMAN in English 8 Sep 81 pp 1, 9

[Article by Warren Unna]

[Text]



WASHINGTON, Sept. 7.—The Government of India finally is about to take the initiative in cancelling its 30-year Tarapur nuclear power plant contract with the USA.

This is because India feels that by October 2 the USA, which has been dilly-dallying on its commitments to sell India enriched Uranium to keep Tarapur refuelled, finally will be reneging. India thinks it then will have the legal argument to get out of its own commitment in the contract to refuel Tarapur only from U.S. supplies or U.S.-approved sources.

Indian officials explained here that the USA in its 1963 contract with India, promised to keep Tarapur refuelled over a 30-year period "as needed", and in annual instalments. The last shipment was pushed by President Carter last autumn over strong opposition from the U.S. Congress. President Reagan's repreesntative in nuclear matters, the Assistant Secretary of State, Mr James Malone, made it plain during Tarapur wind-up negotiations in New Delhi in the end of July that it would be impossible to get Congress to approve any more shipment of U.S.-enriched uranium to India so long as India refused to comply with the U.S. Nuclear Non-proliferation Act requiring international inspection of all of its nuclear installations (not just the U.S.-assisted Tarapur).

It is now learned that India has been secretly testing mixed oxide fuel over the past four years in anticipation of the final breakdown of U.S.-enriched uranium shipment. Indian officials are said to feel confident that they can shift Tarapur's refuelling to mixed oxide over a one-year to 1½-year period by slowing down Tarapur's reactors, but not actually shutting them down.

U.S. officials, last year, had warned that India would turn to the Soviet Union for Tarapur's refuelling if Congress didn't permit the continuance of U.S. shipment. But, instead, India seems determined to become self-reliant and no longer dependent on the whims of any foreign supplier.

Also, even though the original Tarapur contract contained a reference to "fuel produced in Tarapur" as an alternate source, U.S. officials felt the uranium oxide route would be impractical and require a shutdown of some three years.

The manufacture of uranium oxide will require India to make use of its reprocessing facilities and involve the use of the plutonium in the fuel rods which is a by-product of the original U.S. supply.

In the original concept of the U.S. "atoms for peace" programme in which non-nuclear nations were urged to develop nuclear power plants with U.S.-enriched uranium fuel, the idea was that these fuel rods would be indeed re-cycled through reprocessing so as to both make the operation more self-sufficient and eliminate the problem of disposing of the radioactive waste from the spent fuel rods.

But in 1978, the U.S. Congress, under President Carter's urging, adopted retroactive restrictions. President Carter and the Legislators feared that there now was a worldwide danger of missing spent fuel for the development of nuclear weapons and those nations which did not already have nuclear arms might be tempted.

Indian officials think President Reagan's Administration is more "relaxed and realistic" on the issue, and also more pragmatic in recognizing that it is unfair to ask India to depend upon further nuclear fuel shipment for Tarapur which now will never come.

India is prepared to have a final round of talks with Mr Malone on winding up the Tarapur contract. It was made clear to him in New Delhi in July that international inspection of even just the Tarapur plant would not be continued with the cut-off of U.S. fuel.

Instead, India is considering either an oral statement or a written declaration assuring the USA that Tarapur's fuel always will be used for peaceful purposes, that no plutonium end-products, even after the contract is severed, ever will be diverted to the manufacture of nuclear weapons.

It is not clear how the USA will respond to this. But India now is convinced that after October 2 it will have the legal right to do whatever it chooses regarding Tarapur since, by then, the USA will have fallen delinquent on its own ogligations in the contract.

CSO: 5100/7154

RAO REPORTS CAMPAIGN AGAINST NEUTRON BOMB

New Delhi PATRIOT in English 5 Sep 81 pp 1, 7

[Text] India and other non-aligned countries are taking the initiative to persuade the US against going ahead with its decision to manufacture the neutron bomb, Minister for External Affairs, P. V. Narasimha Rao, told the Rajya Sabha on Friday.

Answering a series of supplementaries, the Minister indicated that Foreign Ministers of the non-aligned countries would hold in depth consultations during the coming session of the UN General Assembly to evolve 'a kind of a general consensus' against the growing stockpile of nuclear weapons and the new devices.

The non-aligned countries, and specially India he said had repeatedly voiced grave concern at the developments and had warned against the growing perils of the nuclear arms race and the dangerous concept of 'limited nuclear war,' that was being promoted by some nuclear-weapon nations.

The Government had repeatedly stated India's commitment to the imperative need for nuclear disarmament leading to total elimination of weapon stockpiles.

Pending such disarmament, India together with the other nonaligned countries had been demanding total prohibition of all uses of nuclear weapons.

As such any use of nuclear weapons will be in violation of the UN Charter and a crime against humanity he added.

Mr Rao told Mr Satpal Malik and Mr N.K.P. Salve that the non-aligned countries were already holding consultations amongst themselves and the Foreign Ministers would consider what initiative was possible and feasible.

It would be India's effort Mr Rao said to work for nuclear disarmament in the UN and all other international forums in bilateral discussions with other governments. He told Mr Salve that opposition to the neutron bomb had to beat the political level.

India, however, wanted to consult everyone at the earliest--which would be before the UN General Assembly--instead of acting in isolation, Mr Dinesh Goswami was told.

The External Affairs Minister shared the concern of the members to the growing stockpile of nuclear weapons, and told Mr Yogendra Sharma that Government would consider in what way Parliament should express itself on an appeal sent by the USSR Parliament to all Parliaments of the world against nuclear stockpiles.

Mr J. P. Mathur said since the Soviet Union also had reportedly decided to manufacture the neutron bomb efforts should be made to persuade both the super powers to desist from taking such a 'suicidal' step.

Mr Rao replied that he was not aware of the Soviet decision. Nevertheless, he remarked that in the prevailing atmosphere of arms race, the Soviet Union would not like to be left far behind.

CSO: 5100/7152

AEC CHAIRMAN DESCRIBES THREE-STAGE NUCLEAR PROGRAM

New Delhi PATRIOT in English 9 Sep 81 p 4

[Text] Bombay, Sept 8 (UNI) India's nuclear energy programme is a three-stage process which will overcome the 'not so good' fuel situation, Atomic Energy Commission Chairman H. N. Sethna today observed while delivering the first lecture of the sixth international conference of women engineers and scientists here.

In the first stage, the 'Candu' type reactor, using natural uranium fuel with heavy water moderator, will be employed. When uranium-235 in the fuel is undergoing fission, some of the uranium-238 in the reactor gets converted into plutonium which is nearly fully fissile material like uranium-235. This will be separated by a chemical process and the plutonium obtained, will be used to fuel fast breeder reactors (to be built in the second stage), he said.

A breeder reactor is one which produces more fuel that it burns. This is achieved by surrounding the reactor with a fertile material like thorium or uranium-238 which absorbs the escaping neutrons and gets converted into a fissile material.

These can be extracted again and again and used to fuel another fast breeder. Thus, building of fast breeders in the third phase will sustain the nuclear energy programme for hundreds of years, Dr Sethna added.

Dr Sethna said fusion energy was the ultimate scurce that could solve the energy problems of mankind.

With the increased programme of utilising nuclear energy for power production all over the world, he felt that soon this segment alone could provide over 25 per cent of the world's energy requirements.

The known reserves of uranium could meet the energy requirements of the world for a few thousand years based only on fission reactor technology if intelligently exploited, he said. Once fusion reactors became practical, the energy problem could be considered to have been solved forever, Dr Sethna said.

CSO: 5100/7155

STATION TO BE BUILT WITH INDIGENOUS TECHNOLOGY

Bombay THE TIMES OF INDIA in English 6 Sep 81 p 6

[Text] New Delhi, September 5 (UNI)--The fifth atomic power station proposed to be set up at Kakrapar in Surat district of Gujarat will be built with cent per cent indigenous technology.

For the fuel and heavy water the project will not depend on any external agency and the reactors will be outside the safeguard restrictions, according to the latest issue of Nuclear India, published by the department of atomic energy.

Environment protection has been accorded high priority and the project will meet the standard requirements for minimising environmental pollution.

The fuel will be fabricated at the nuclear fuel complex, Hyderabad, in the department of atomic energy, which is being expanded in a phased manner to cater to this and future projects.

The proven reserves of uranium are considered adequate to support the power programme as currently envisaged.

In the sixth plan provision has been made for commencing work on the construction of six such reactors, which will raise the nuclear power generation capacity (under operation and construction) from 1,800 Mw at present to 3,210 Mw by the end of the plan period.

The fifth atomic power station will finally comprise four reactors of 235 Mw each. It has been decided to generally adopt the concept of a four-reactor station at all future sites to enable maximum utilisation of the site infrastructure, according to the department of atomic energy.

CSO: 5100/7153

BRIEFS

NEW URANIUM FINDS--New Delhi, Sept 10--There have been new indications of the presence of uranium in some parts of the country, the Lok Sabha were informed yesterday, reports PTI. However, more details would be available only after the investigations, which are in progress, are completed, Mr C. P. N. Singh, Minister of State for Science and Technology, told Mr Madhavrao Scindia in a written reply. [Text] [Calcutta THE STATESMAN in English 11 Sep 81 p 7]

HEAVY WATER PRODUCTION--India will achieve self sufficiency in heavy water (for atomic power stations under construction) with the commissioning of the Kota and Talcher plants before March, 1982, reports UNI. Minister for Science and Technology C.P.N. Singh told the Lok Sabha that construction of more heavy water plants was planned to meet the needs of future power stations. [Text] [New Delhi PATRIOT in English 13 Sep 81 p 5]

URANIUM DEPOSITS DISCOVERED--A significant concentration of uranium has been found in the Shillong plateau of Meghalaya. Uranium has also been detected in the old crust rocks in some localities of the Garo hills in Meghalaya and the Mikir hills of Assam. [Text] [Delhi Domestic Service in English 0240 GMT 24 Sep 81 BK]

CSO: 5100/2005

SITE SOUGHT FOR NUCLEAR POWER PLANT

Jakarta HARIAN UMUM AB in Indonesian 21 Jul 81 p 3

[Article: "BATAN Ready To Use Nuclear Energy To Power Electric Power Station"]

[Text] Baiquni, chairman of BATAN (National Atomic Energy Agency), said his agency is ready when the government decides to use nuclear energy to power electric power stations in Indonesia.

Responding to a question from the press after having been received by President Suharto at Cendana Street on Monday [20 July], Baiquni said BATAN is still exploring the need to add nuclear-powered stations considering that Indonesia has many sources of energy such as oil, coal, water, and so on to power such stations.

Nevertheless a study made by BATAN, a State Electric Company consultant, and the Board for the Study and Application of Technology concluded that at some later date Indonesia will be forced to use nuclear energy to power electric power stations.

Therefore, Baiquni said, his agency is beginning to look for a possible good site in which to locate a nuclear-powered station complex. In this connection an in-depth study is underway on the selection of such a site. It involves several aspects including population density within a certain fixed radius of such a site.

Selection of a site is very important to prevent undesirable incidents such as nuclear leaks.

When asked about when construction of such a station would begin, Baiquni said it depended on a government decision. "We are just getting prepared against such an eventuality so that when the decision is made, we will be ready," he added.

Regarding the eventual electric power station capability, Baiquni also said it depended on the requirements although a feasibility study done on such a station indicated that it would be capable of producing 60 MW.

Regarding the cost of constructing such a station, Baiquni said it depended on when it would be built, the components used as well as the technical expertise required.

If the station had been constructed in the past (several years ago--editor), it would have cost less because by now components possibly could have been produced domestically and meanwhile technological expertise from abroad could have been replaced with our own manpower.

The BATAN chairman had reported to the chief of state on the implementation of cooperation on technological expertise as well as technology with France, Italy, and other Western European nations.

He said Indonesia had sent 22 experts to France to further their knowledge while sending experts to Italy is still being studied.

6804
CSO: 5100/8115

PROFESSORS SCORE U.S. NEUTRON BOMB PRODUCTION

OW290323 Hanoi VNA in English 0257 GMT 29 Sep 81

[Text] Hanoi, 29 Sep (VNA)--"Reagan's decision to produce and deploy the neutron bomb is to serve U.S. wars of aggression," said Doctor Tran Quoc Thuong of the Vietnam Nuclear Research Institute to V.N.A. on September 28.

Tran Quoc Thuong, who obtained the doctoral degree of atomic energy in France, is now working for the atomic energy service in Vietnam. He stressed that "the neutron bomb is a form of radioactive nuclear bomb which causes not only immediate but lasting effects, both in direct and indirect ways."

"The world public has for many years condemned chemical warfare but the U.S. used chemical weapons during the war in Vietnam. I think that everybody must adept a clear-cut attitude against U.S. production of the neutron bomb, especially in the situation that the Reagan administration is taking a militarist tendency, stepping up the arms race, and using sciences to threaten world peace," he said.

Doctor Phan Van An of the Vietnam Institute of Sciences, who previously studied in the Soviet Union and Bulgaria, said: "The neutron bomb, which is very different from the U.S. Government's statement, is a weapon used in attacks, land occupation and mass killing." He added: "We energetically oppose the U.S. decision to produce the neutron bomb, because its purpose is completely inhuman and against sciences."

For his part, assistant professor Luu Tien Hiep, who obtained the doctoral degree of chemistry in Australia and is now teaching at the polytechnic in Ho Chi Minh City, said: "The U.S. imperialists, who used atomic bombs in Japan, must be condemned by all people, and strong measures must be taken to oppose the U.S. production of the neutron bomb."

He said: "As A. Einstein and his colleagues and the peace-loving people have strongly protested against the use of atomic bomb, I hope that the scientific circles and the majority of the American people must be the first to adopt adequate actions against the U.S. present production of the neutron bomb."

CSO: 5100/4501

BRIEFS

HEAVY WATER PLANTS--Buenos Aires, 23 Sep (TELAM)--Dan Benningson, director of the National Atomic Energy Commission [CNEA], said at Ezeiza Airport, in reply to a question asked by newsmen if the public expenditure cut would affect the Argentine nuclear program, that any cut has some effect, but that the progress of all programs continues. Benningson arrived today after participating in a technical meeting in Germany during which the limits of releasing radioactive material in the environment were discussed and various technical methods to limit the discharge of such material in the atmosphere were made known. Benningson referred to the building of heavy water plants, saying that two such plants are now under construction. One is a small plant being built with Argentine technology: a pilot plant which will serve us--after it starts functioning--as the basis for another bigger one in the future which is under construction near the Atucha nuclear center. There is another, the industrial plant with Swiss technology, being built by the Schultzer Company at Arroyito in Neuquen Province. This plant will produce 250 tons of heavy water per year as of 1984. [Text] [PY242033 Buenos Aires TELAM in Spanish 1558 GMT 23 Sep 81]

CSO: 5100/2005

LOADING OF ANGRA I REACTOR AUTHORIZED BY CNEN

Rio de Janeiro JORNAL DO BRASIL in Portuguese 16 Sep 81 p 23

[Text] Brazil will enter the nuclear age this weekend. The CNEN--National Nuclear Energy Commission--authorized FURNAS [Brazilian Powerplants] to load the core of the Angra dos Reis Powerplant No 1 nuclear reactor with the 50 tons of fuel elements which will be burned to generate "nuclear steam heat." However, it will not be until the end of November that power generated by the nuclear powerplant will go on line into the electrical system of the Southeast.

The information was provided by FURNAS President Licinio Seabra, who expects that the operation of the powerplant will not cause an increase in electric power rates--at least not in the short term--to help defray the $1.3 billion cost of the first Brazilian nuclear powerplant.

Greater Costs

Seabra said that at the end of November, after the conclusion of the critical tests, the phase which follows the loading of the core, the powerplant will begin to operate at only 10 percent of its nominal operating capacity of 620 megawatts. He expects that in March next year the plant will reach its full capacity of 100 percent in keeping with the following percentages: 30 percent, 50 percent, 75 percent and 90 percent. Thereafter, "If nothing unforeseen happens," as Seabra observed, the plant will continue to generate at 70 percent of its capacity, the average operation. The FURNAS president expects the DNAEE--National Water and Electrical Power Department--to seek ways of recovering the costs of the nuclear powerplant. He believes this will take place, perhaps even in an overall way, because the leaders of the electric power sector are trying to obtain a remuneration of 10 percent for the companies in order to balance the energy sector.

Seabra admitted that the repayment of the costs of the Angra dos Reis Powerplant No 1--higher between 20 and 30 percent than those of hydroelectric powerplants--will take place only in the next 20 to 25 years, the useful life of a nuclear powerplant.

The FURNAS president also said that the loading of the core with fuel elements takes from three to four days. However, if during the course of the critical tests some abnormality takes place, the powerplant will be shut down because, according to him, the important thing "is its safety."

Construction on the Angra dos Reis Powerplant began in 1972. Its cost at that time was budgeted at a little less than $400 million, a cost of $300 per kilowatt installed. That same kilowatt almost 10 years later costs $2,000. The 50 tons of fuel cost FURNAS nearly $30 million at 1978 prices.

As of January next year, when the powerplant will be generating power at its full capacity, FURNAS will begin to concern itself with its reloading, which will take place 14 months later. The powerplant will be down for at least a month so that one third of its spent fuel can be removed.

Seabra reported that Westinghouse, after acceptance of the powerplant by the CNEN as being ready to operate, will remain on-site for one year observing the operation of its equipment. This is the warranty period. Up to December, after the loading of the reactor core, some intermediate tests will still be run: precritical, low power (physical), stationary power, power (transient) and acceptance. The symbolic pre-inauguration of the powerplant, with a low-key ceremony, will take place next Tuesday and will be attended by Minister of Mines and Energy Cesar Cals.

8908
CSO: 5100/2332

CONCRETE FOR REACTOR BUILDING SLAB FINALLY POURED AT ANGRA II

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 16 Sep 81 p 25

[Text] With a delay of three years and costs of 7.5 billion cruzeiros just for the completion of its foundations, the Angra II nuclear powerplant yesterday began pouring concrete for the slab on which the reactor building will be built. The slab, which is costing 240 million cruzeiros, will be poured within three days but will only be in a condition to receive the reactor building in November.

The superintendent of the NUCLEBRAS [Brazilian Nuclear Corporations] Nuclear Powerplant Construction Corporation (NUCON), Emilio Claudio Leme, declared yesterday at Angra dos Reis that the corporation budget for 1981 was estimated at 43 billion cruzeiros, but he did not reveal how much has been paid up to now, limiting himself to saying: "I am already receiving that money."

Emilio Lemes, who previously denied the participation of the Norberto Odrebech Company in the Angra II project, reported that the company will build the infrastructure of that powerplant, with the rest of the civil construction being done by companies whose qualifications are being checked.

Technicians of the nuclear sector explained yesterday in Angra dos Reis that the Norberto Odebrecht Company will transfer the technology it obtained from the German company Hotchieff to other construction companies, which are going to be working in Angra III, if it is paid the sum of $100 million. This amount, according to the same technicians, is the equivalent of what a foreign company would charge at this time for providing the technology of nuclear powerplant civil construction. A serious technical problem brought to the attention of those technicians is that NUCLEBRAS did not even receive half of the 107 billion cruzeiros of its 1981 budget, and it is not in a condition to carry out its programs. Angra II is now working on the slab for its nuclear reactor building, while Angra III will not have its infrastructure ready until October 1982.

Stocked Material

The technicians believe that the Angra II difficulties will not change much. Of the 300 piles of the reactor site, 88 were built to reinforce the foundations at a cost of an additional 440 billion cruzeiros [as published, presumably 440 million]. Each piling cost 500,000 cruzeiros and the 300 pilings cost 1.5 billion cruzeiros all together. Total cost of Angra II according to Emilio Leme, will be 30 billion cruzeiros. Counting technicians, administrative personnel and laborers, there are 180 men working at the powerplant site at this moment.

Yesterday, NUCON checked the qualification of nine firms which bid for the work at Angra II; the results should be reported this week. They are: Camargo Correia of Sao Paulo; Andrade Gutierrez, Minas Gerais; Mendes Junior, Minas Gerais; Cetenco Sao Paulo; Servix, Sao Paulo; Alcino Viera-Convap, Minas Gerais; Guaranta, Sao Paulo and Constran, Sao Paulo.

8908
CSO: 5100/2332A

BRIEFS

NUCLEAR PLANT OPERATIONS--Two hundred-ten billion dollars and 10 years later, Brazil will enter this week into the closed club of atomic-energy-generating countries. The Angra 1 plant's generator core has been charged with fuel elements since yesterday so that it can start generating steam by Tuesday [22 September]. In December this steam will be used to drive the electric energy generators. The first nuclear plant goes into operation at a time in which Brazil does not even use up all the energy being generated by the hydroelectric plants. The government is then justifying the nuclear program as a strategic necessity. For the scientific community, there are less-expensive alternatives if the objective is to produce atomic bombs. [Text] [PY240123 Rio de Janeiro JORNAL DO BRASIL in Portuguese 20 Sep 81 p 1]

GOVERNMENT TO SELL URANIUM--Rio de Janeiro, 23 Sep (AFP)--Brazilian Mines and Energy Minister Cesar Cals today announced that Brazil will finance its nuclear program with the exports of enriched uranium that will start in the decade of the 90's. Cals said that the construction of an industrial complex to produce uranium will start in 1982 [words indistinct] the type of enriched uranium that will be produced in Brazil. Cals also said that the Brazilian nuclear plant--being implemented under the framework of the nuclear agreement signed with the FRG--will require an investment of $25 to $26 million. This program includes the complete chain of necessary operations for uranium prospecting its extraction, treatment and the installation in Brazilian territory of a nuclear reactor factory, a plant to produce nuclear fuels and another for the treatment of radioactive fuels. Cals said during a visit he made to the first Brazilian nuclear plant that the Brazilian nuclear program is sovereign and has exclusively peaceful goals. [Excerpts] [PY241209 Paris AFP in Spanish 1758 GMT 23 Sep 81]

CSO: 5100/2005

BRIEFS

URANIUM DEPOSIT FOUND--The director of the mining institute has reported that a uranium deposit has been found in Chile. He did not report, however, where this deposit is found or how vast the uranium deposit is since he said that there are industrial secrets. He said that this is the first time a uranium deposit has been found in Chile. He noted that this was the result of about 20 mining explorations being carried out in Chile. [Santiago Chile Domestic Service in Spanish 1730 GMT 23 Sep 81 PY]

CSO: 5100/2004

FRANCE, IRAQ DISCUSS REBUILDING REACTOR

London 8 DAYS in English No 34, 29 Aug 81 p 56

[Article by Howard Schissel]

[Text] THE VISIT to Paris on 19-20 August of the Iraqi deputy premier, Tariq Aziz, enabled France and Iraq to open up a constructive dialogue over the eventual French participation in the reconstruction of the Tammuz nuclear research centre. The Iraqi leader met President Francois Mitterrand, Prime Minister Pierre Mauroy, Defence Minister Charles Hernu and Minister of Foreign Trade Michel Jobert.

The new French government sees little reason why it should refuse Baghdad equipment for the peaceful use of nuclear energy when it is being supplied readily to a growing number of countries in the Third World.

Negotiations between the two capitals on this issue could get under way in the near future. However, *8 Days* has learnt that France will insist on an unprecedented series of safeguard clauses.

The most important will probably involve the replacement of the highly-enriched uranium originally specified to power the Tammuz reactors by a low-grade fuel known as 'caramel' which is practically impossible to convert to military use. In the past, the Iraqis have systematically rejected such a suggestion and it could become a serious sticking point.

But Baghdad is not without leverage in the difficult talks. For example, Saudi Arabia has declared that it would finance, if necessary, the rebuilding of the Tammuz site. If the Saudis put pressure on President Mitterrand during his state visit to Riyadh at the end of September to honour the original contracts, it would indeed be delicate for France to propose a new accord which satisfies neither the Saudis nor the Iraqi leaders.

From the economic point of view, Iraq could threaten to end its special oil relationship with France: the ten-year cooperation agreement with the state-controlled oil concern, Compagnie Francaise des Petroles (CFP-Total), comes up for renewal in June 1982. In 1980, CFP lifted 13m tonnes of Iraqi crude, and certainly does not want to lose this precious source of oil, once the country's hydrocarbon industry gets back to normal.

French firms are particularly interested in winning contracts in Iraq's economic development programme as well as to participate in the reconstruction of the country when the war with Iran is over.

Iraq has been one of France's best clients for modern arms systems in the Middle East during the past decade, and the Mitterrand government dearly wants to maintain this precious link.

The Iraqis, for their part, could use the prospect of future arms deals as an added form of pressure. Paris intends to sell its new generation single-jet fighter, the Mirage 2000, to Iraq and it would also like the Iraqis to participate in the financing of the twin-engined Mirage 4000.

Thus the forthcoming Franco-Iraqi negotiations on the reconstruction of Tammuz will be an acid test of the Mitterrand government's intentions in the Middle East. The outcome of these talks is likely to affect more than just Paris's ties with Iraq.

CSO: 5100/4701

SELF-SUFFICIENCY IN NUCLEAR REACTORS SOUGHT; NEW NUCLEAR POWER PLANT

Nuclear Energy Chief Profiled

[Article by Berna Maree: "Cabinet Maker Becomes Nuclear Chief"]

Johannesburg DIE TRANSVALER in Afrikaans 1 Sep 81 p 11

[Excerpts] Pretoria--Dr. J. W. L. deVilliers nuclear physicist, member of the South African Institute for Physics and of the South African Institute for Mechanical Engineering and also registered professional engineer, became president of the Council on Atomic Power in 1979.

Preference

His new position as chairman of the controlling board, which will combine and control the activities of the Council on Atomic Power and the Uranium Enrichment Corporation, was announced at the end of July by the minister of Minerals and Energy Affairs, Mr. F. W. deKlerk.

Dr. DeVilliers is a scientist with a wide range of interests and woodworking is said to be his chief predilection.

Dr. DeVilliers is optimistic on the future of nuclear development in South Africa. His present complaint is the great shortage in trained personnel...a phenomenon which South Africa has to cope with on a wide front. In the Nuclear Science area he estimates this to be nearly 20 percent.

Dr. DeVilliers regrets the fact that, because of this shortage, highly specialized people must often perform timewasting routine tasks which can be performed just as well by persons who have not undergone such an intensive and greatly demanding training.

His greatest ideal is to see South Africa completely self-sufficient in the area of its nuclear energy requirements. But for the time being this is impossible, although future plans are directed toward this aim.

A serious study is now being made of the possibility of manufacturing sufficient nuclear fuels locally to fill the country's requirements. When the Koeberg power plant at Capetown goes into operation in the first half of 1982 South Africa will still be dependent on other countries for its fuel requirements.

Matters which require serious consideration are the completion of the nuclear fuel cycle and the establishment of an industrial technology aimed at making it possible for South Africa to build its own nuclear reactors.

In the meantime South Africa is deriving great advantages from what has already been achieved thus far. Production of isotopes for medical purposes is making great contributions in medicine, while it has already been proven that nuclear technology is eminently suited for many applications in agriculture and industry.

Research in marketing irradiated foods is in an advanced stage and irradiation treatment of animal products is also enjoying continuous attention.

At an international level we are collaborating "with all those countries which are willing to collaborate with us on the peaceful application of nuclear energy," so stated Dr. DeVilliers. Scientists seldom experience problems among themselves. Where problems do arise are in those instances where international politics are injected into nuclear matters.

With respect to reports of a nuclear explosion by South Africa, a smiling DeVilliers said: "This is pure speculation."

Country Boy

The 52-year-old Dr. DeVilliers has come up a long way on the road to scientific development and nuclear physics. Born in the Free State, a country boy in Smithfield's world, he was introduced to the scientific career when he went to school. At that time he built radios and kept himself busy with electronic equipment.

After his first year of having obtained the BS degree at the Free State University, Dr. DeVilliers went to the University of Stellenbosch where he acquired the MS degree (cum laude) in 1951. From 1952 to 1958 he worked at the Council for Scientific and Industrial Research in Pretoria. In 1957 he acquired a doctor's degree at the University of Stellenbosch.

In 1958 Dr. DeVilliers held a scholarship from the Council on Atomic Power and after additional training and research at well known institutions such as the Argonne and Brookhaven National Laboratories in the United States, he returned to the Council on Atomic Power in 1962 and in 1967 he became the director of the council's Division for Reactor Development.

He has written about 25 scientific publications.

Dr. DeVilliers is the father of four children, two boys and two girls, one of which is already married.

Site of Second Plant

Johannesburg DIE TRANSVALER in Afrikaans 1 Sep 81 p 2

[Text] Capetown--South Africa's second nuclear power plant will possibly be built in the Eastern Cape between the Kowien Tsitsikam River, according to a report by the South African Press agency.

The Coordinating Council for the Protection of the Environment in the Eastern Cape has been asked by the Electricity Supply Commission to provide comments on possible places where an additional nuclear power plant can be built and Dr. T. Woodridge, a member of the council, has stated that a comprehensive report has already been sent to the Electricity Supply Commission.

If the Council's advice is accepted such a power plant will certainly be built west of Cape Saint Francis between Jeffry's Bay and Plattenberg Bay.

Dr. Woodridge says that the area is thinly populated and has an open coastline with strong sea currents necessary for dispersing waste.

Regions such as Algoa, which are protected, must be avoided as are also thickly populated areas such as the coast close to Port Elizabeth.

Still another consideration is that a strip of land of about 1 kilometer in width is necessary for connecting the nuclear power plant onto the national network.

The council has asked the Electricity Supply Commission for a complete environmental study before the final decision is made.

Dr. Woodridge said that it is general knowledge that people who are dedicated to the preservation of the environment are not happy with the location of the Koeberg power plant.

Mr. Boet Uys, a liaison official of the Electricity Supply Commission, has confirmed that a study has been initiated on other possible sites where nuclear power plants can be built.

7964
CSO: 5100/4968

BRIEFS

SECOND NUCLEAR PLANT SITE--Cape Town--South Africa's second nuclear power station will be situated between the Kowie River and the Tsitsikama River on the east coast, probably west of Cape St Francis. This became apparent after Escom had asked the Co-ordinating Council for Nature Conservation in the eastern Cape to give possible sites for the second atomic power station between Port Alfred at the Kowie River mouth and the mouth of the Tsitsikama River. Dr T Woolridge of the CCNCEC said an extensive report had been submitted to Escom on possible sites. He said the area had a sparse population and an open coastline with strong currents necessary to dispel outfall. Areas to be avoided were sheltered bays, such as Algoa Bay and Francis Bay, and high-density areas such as the coast near Port Elizabeth. The CCNCEC also thought a corridor about a kilometre wide was necessary to link power lines from the station with the national grid. The corridor for the power lines from the station should not run through areas where it would destroy natural vegetation. "The coast west of Cape St Francis is the least sensitive area under consideration," said Dr Woolridge. [Text] [Johannesburg THE STAR in English 1 Sep 81 p 4]

CSO: 5100/5601

AERIAL SEARCH FOR URANIUM DESCRIBED

Salisbury BUSINESS HERALD in English 24 Sep 81 p 14

[Selection from feature "Mining Survey" compiled by Andrew Whaley entitled: "Target--Uranium: The Search Is on From the Air"]

[Text]

FLYING in a Dakota at an altitude of 100 m, up to 10 hours at a stretch, and on flight lines that vary from as little as 5 to 40 km, may seem a little like going round in ever-decreasing circles.

But it is actually the basis of one of the most sophisticated "prospecting" operations being conducted in Zimbabwe.

Geological exploration has come a long way from the proverbial bearded prospector scouting the wilderness with his donkey for valuable minerals.

Today the airborne search can save time and, in the long run, money; particularly when one is looking for "elusive targets" spread over vast areas.

A number of companies are undertaking such an operation in the Kariba and Wankie area, in the search for uranium, base metals and other geological data.

A senior geophysicist with one of these companies, Mr Eddie Kostlin, who is supervising the search, summed it up this way: "You can fly in one day what a guy on the ground would probably take several weeks to survey."

This particular operation has a team of eight — two pilots, a navigator, one technical operator (all of these actually work in the Dakota during the survey); and two data compilers, a geophysicist and an engineer, who normally stay on the ground.

"You have to have people who can get on with each other," Mr Kostlin said, particularly as they spend long hours in the air together under conditions of limited movement.

"Normally on a survey, there is a good team spirit. After all, you are sitting up in the air facing the same dangers of dropping out of the air," he said.

But quite apart from the necessity of a team spirit, a sophisticated operation of this kind carries another and more pressing problem: accuracy.

Instruments have to work properly and the data has to be readable for accurate analysis.

And this is where the team work really starts.

It means that the pilot has to fly straight on a flight line — no mean feat in a lumbering Dakota which has to be held at a height of 100m.

Although the survey may require a flight line as long as 300 km, the present operation over the Zambezi escarpment is being carried out on lines from 5-40 km which means that the pilot has to fly out and back at short intervals over another flight line 500 m apart.

The navigator has a vital function in helping here. He has to make sure that valuable ground is not lost by incorrect spacing and zig-zagging flight lines.

In fact, a few days of time and money might be lost through re-flights at the end of the survey, if this aspect of the survey is not carried out accurately.

Mr Kostlin has always insisted on a navigator for this reason, "otherwise the navigation goes skew, lines go skew and the altitude is not kept constant".

Often airborne surveys done in smaller planes do not have space for a navigator, Mr Kostlin said. "That is one of the reasons why I prefer to use a Dak."

A fourth person on the plane is responsible for the intricate handling of the instruments. He is the operator, a very specialised technician.

His basic concerns are for the magnetometer, the spectrometer — which is like a sting in the Dakota's tail — and the automatic camera.

The magnetometer, as it suggests, picks up magnet responses from ore bodies, and from this records analogically and digitally.

From these readings, a magnetic contour map can be prepared either by computer or manually, Mr Kostlin said, and "anomalies like highs and lows" can be deduced.

Since the early 1950s geologists and physicists have learned to approach the data given by these magnetometers with far greater awareness and knowledge, he said.

Even more advanced is the spectrometer which then computes readings into a radiometric contour map locating certain radio-active deposits.

In addition, the spectrometer can provide information for what are called "stacked profiles", which give the exact potassium, thorium, uranium or total count of radio-activity in a specific area.

The operator sees that these instruments are functioning accurately and it is his job to ensure that the "noise" level from the plane or from outside, does not interfere.

"Magnetic storms, which are caused by sun spot activity, can last from anything from a few minutes to a few days. This can also affect the survey," Mr Kostlin said.

Lightning is a disaster to a survey because "spikes" occur on the recordings.

And then there is the human control of the pilot whose speed and altitude have to be checked very carefully.

"If he flies too fast we are going to miss something," Mr Kostlin said.

With a magnetometer reading every second, the pilot has to maintain an optimum speed to allow one reading every 50 m, he added.

The operator is also responsible for maintaining checks on the camera in the back of the plane which, as Mr Kostlin put it, "shows you where you have been".

This is not as mundane a sentiment as it sounds at first. Very often wind and drift can cause jumps in a flight line.

It is, therefore, necessary to complete an accurate mosaic of numbered and integrated photographs which can pinpoint exactly the geological targets.

The two data compilers in the Anglo American project are responsible in their own way for achieving this. They prepare the flight paths, develop the film and edit the recordings.

Said Mr Kostlin: "Flying 1 200 or 1 300 km a day, there is a fair amount of data to compile. They have to be up to date. Sometimes it means working in the night to get the facts ready for the following morning's flight."

And after the survey? After the weeks of escarpment heat and exacting work under confined conditions?

The data that has been collected can take from six weeks to two months to draw up final maps and make sense of the information.

That job finally rests with Mr Kostlin as geophysicist.

"I have to see that the job gets done as efficiently as possible," he said. "I have to look at the recordings and start some evaluation, an interpretation in the field as soon as possible, although I will start major work in the office."

Mr Kostlin is adamant that the only way to conduct these surveys is in a Dakota. It allows greater space, has a greater fuel capacity (and therefore can do longer runs more productively and efficiently) and it also has enough room for two bulky gamma ray detecting crystals.

"Besides," he said, "on a small plane normally you have to have a vehicle following, but on a Dakota you can carry it all with you."

"There are lots of challenges in getting the exercise together, in getting the team together," he added.

"These people are rare animals," he said about his colleagues on the survey. "Normally electrical boffins want to sit around in labs and fiddle with oscilloscopes."

But carrying out spot-on surveys in the field is a different proposition and one which requires a specialist approach to the conditions that apply there.

For instance, in the case of the pilot, Mr Kostlin remembers one occasion when he hired a Jumbo pilot to fly in a straight line at an altitude of 100 m.

"He was fine flying Jumbos at 30 000ft, but we had skew lines..." he went on.

And is he hopeful of finding uranium?

"You must always be hopeful. Anybody who looks for minerals must be hopeful. There is always something to give you hope.

"There are always lots of indications of mineralisation around the show, although a lot of them come to nothing. But you must have hope otherwise you cannot do your job."

CSO: 5100/5600

POLL SHOWS CONTINUED OPPOSITION

Copenhagen BERLINGSKE TIDENDE in Danish 14 Sep 81 p 7

[Article by Asger Schultz, director, Gallup Institute: "Continued Preponderance of Opposition Against Nuclear Power"]

[Text] In a continuing series of polls of public opinion concerning the introduction of nuclear power in Denmark, the Gallup Institute asked the following question of a representative group of adults: "The Folketing has postponed the decision to build nuclear power plants in Denmark until a sufficiently safe means has been found to store nuclear wastes. If or when the Folketing at some time believes that this problem is solved, and decides to build nuclear power plants, this question will possibly come to a popular vote. In a popular vote will you vote yes or no to nuclear power?"

The most recent poll was conducted in August 1981, and the following table shows the results of this latest poll plus for comparison the results of previous polls, including the results of the last poll before the Harrisburg accident, which took place in March 1979.

	Dec 1978 %	Apr 1979 %	Jun 1979 %	Sep 1979 %	Jan 1980 %	Jun 1980 %	Feb 1981 %	Aug 1981 %
Vote for	39	30	32	36	37	37	39	36
Vote against	38	54	51	46	44	41	47	48
Don't know	23	16	17	18	19	22	14	16
Total	100	100	100	100	100	100	100	100

The shock after Harrisburg is clearly evident in a comparison between the figures for December 1978 and April 1979. The number of supporters was reduced by one-fourth (from 39 percent to 30 percent) while the number of opponents was increased by almost 50 percent (from 38 percent to 54 percent), with the result that an absolute majority opposed nuclear power in Denmark, whereas the result before the Harrisburg accident was almost a "dead heat."

After the accident the differences gradually evened out, and later the number of supporters rose to the level of before the Harrisburg accident, almost 40 percent of the population.

On the other hand, the opposition seems to have stabilized at a considerably higher level than before the accident. At that time it was less than 40 percent, but now it seems to have stabilized at a level nearer 50 percent.

As the comparison is somewhat disturbed by the changing "don't know" percentages, the following table shows the division between supporters and opponents when the "don't know" answers are disregarded.

	Dec 1978	Apr 1979	Jun 1979	Sep 1979	Jan 1980	Jun 1980	Feb 1981	Aug 1981
	%	%	%	%	%	%	%	%
Vote for	51	36	39	44	46	47	46	43
Vote against	49	64	61	56	54	53	54	57
Total	100	100	100	100	100	100	100	100

It is evident that the effect of Harrisburg has apparently been that the "don't know" percentages became smaller, and the small relative majority or "dead heat" has been changed to a clear majority against nuclear power in Denmark.

9287
CSO: 5100/2328

COMPETITIVENESS OF NUCLEAR POWER DOCUMENTED, PROJECTED

Paris L'USINE NOUVELLE in French 10 Sep 81 pp 70-71

[Article by Claude Goudier]

[Text] When the in-depth debate requested by Francois Mitterrand on the future of the current nuclear energy program takes place in the National Assembly in October, the proponents of this program will have a weighty argument in hand to support their position from the economic standpoint: The competitiveness of nuclear energy continues excellent as compared with fossil energies.

The EDF [French Electric Power Company] and the AEC [Atomic Energy Commission] have just completed a study that updates the cost per kilowatt-hour [kW-hr] of nuclear energy. This cost, as of 1 January 1981, comes to 15.69 centimes, whereas that of energy obtained from desulfurized coal comes to 55.35 centimes per kW-hr. These costs are based on plants scheduled to be put into industrial service in 1990.

Considerable Upgrading of Safety

The analysis of electrical energy production costs is an arduous undertaking. More and more precise data on the different components of this cost are becoming available today, however, particularly as regards conventional assumptions. "Thus," explains Jean Bergougnoux, deputy chief of the EDF's Economic Studies Service, "in the investments domain, EDF calculations are based on the same worth-conversion rate as the Plan, or 9 percent per annum. Amortization of the plants is calculated in equal annual installments over a period of 21 years, and the comparison between nuclear plants and conventional thermal plants is based on full operation, that is, constant use, except, of course, malfunctional and maintenance outages. The cost per kilowatt produced by a plant is taken to be the sum of its investment, operating and fuel costs.

Expressed in francs per kW-hr, the investment cost is calculated by taking as a reference a plant put into service in 1990 (two 1,300-MW [megawatt] sections for the nuclear case, or two 600-MW sections for the fossil fuel case). It includes all construction costs, and interim interest charges as well as an allowance for dismantling in the nuclear case. As of 1 January 1981, the cost per kW is found to be: for the nuclear case, Fr 4,850; for the coal-fired, Fr 3,725; and for the oil-fired, Fr 3,100.

The rise in the cost of nuclear energy in the course of the years has been substantial (in 1978, its cost was Fr 2,840). It is owing essentially to the considerable upgrading of safety. Added to this is the factor of a skilled labor component whose salaries climb steadily year by year, and that of sites, which are becoming scarcer and therefore more costly.

As for the operating costs--Jean Bergougnoux continues--the calculation is simple: They are broken down into average annual fixed costs and proportional costs (wages of regular plant staff, maintenance, taxes, technical and administrative expenses). In the case of nuclear energy, these costs represent Fr 181/kW/yr; in that of coal, Fr 180; and in that of oil, Fr 161.

What Will Have To Be Paid Between 1990 and 2010

As regards the third component of the cost per kW--the fuel cost--its analysis is complex, in that, in the nuclear case, several industrial operations are involved, from the mining of the uranium to its reprocessing. A distinction must be drawn therefore under three major headings: The extraction and concentration of the ore in the form of oxide; the enrichment and fabrication of the fuel elements; and the reprocessing of this fuel (recovery of the plutonium and storage of the wastes).

"Uranium market prices, as we know," says Jacques Baumier, assistant to the head of the AEC's Programs Department and head of its Economic Affairs Section, "have collapsed recently, plunging from $48/lb in 1979 to $25/lb. But what concerns us is the price we will have to pay for this mineral between 1990 and 2010. Here, the estimates of the experts vary widely. Some expect a turnabout in the situation, others think the current slump will continue. As far as we are concerned, we think that by 1990 the price will be around Fr 500 ($48) per kilogram, which is the level we are currently using in our calculations."

Before its enrichment, the uranium concentrate must undergo a process called conversion or fluorination. This is a physico-chemical operation that has been thoroughly mastered by Comurhex, a subsidiary of PUK [Pechiney-Ugine-Kuhlmann], the cost of which comes to Fr 31/kg of uranium.

After conversion to a hexafluoride, uranium must be enriched, a prerequisite for its use in light-water reactors. The two varieties or isotopes comprising the uranium must be separated, in order to concentrate the fissile one. This is a "service" operation performed in the vast plant operated by EURODIF [European Diffusion Agency] at the Tricastin site, involving the complex notion of the UTS [separative work unit]. Practically 4.31 UTS's are required to obtain 1 kg of 3.25-percent enriched uranium from 6 kg of natural uranium. The projected cost of this service by 1990: Fr 660/UTS.

After enrichment, the uranium must be processed for assembly into metallic cladding tubes that will constitute the core of the reactor. A company linked to PUK and to COGEMA [General Nuclear Materials Company] processes this fabrication, the cost of which was, in January 1981, Fr 1,045/kg. Based on assumptions of substantial technical advances and increased production capacities, EDF projects a drop in this cost to a bottom price of Fr 740/kg.

Nuclear and Conventional Thermal Energy Production Costs
(as of 1 January each year)

Worth-conversion rate	10 percent				9 percent	
Actualized potential operating time	54,100 hrs			53,000 hrs	56,900 hrs	
Year	1974	1975	1976	1977	1978	1981
Investment cost (Fr/kW):						
Nuclear	1,380	1,900	2,100	2,650	2 840	4,850
Thermal (mean)	830	1,090	1,200	1,500	2,350	3,400
Actualized potential mean cost (centimes/kW-hr):						
Nuclear:						
Investment	2.6	3.5	3.9	5	5	8.48
Operation	1.0	1.2	1.7	1.8	1.9	3.04
Fuel	1.3	1.8	2.1	2.7	3.5	4.17
Total	4.9	6.5	7.7	9.5	10.4	15.69
Conventional thermal:						
Investment	1.5	2.0	2.2	2.8	4.1	6.54
Operation	0.9	1.1	1.4	1.5	2.0	3.07
Fuel	7.1	7.3	8.0	9.1	8.7	15.00
Total	9.5	10.4	11.6	13.4	14.8	24.61
Nuclear/coal ratio	0.52	0.63	0.66	0.71	0.70	0.63

Source: EDF.

Despite a substantial rise in investment costs, essentially owing to safety measures, the competitiveness of the nuclear-generated kilowatt-hour is not breached.

After burnup in the plant's nuclear boiler, this fuel must be reprocessed in COGEMA's plant in The Hague. This is an operation that requires extraordinary precautions, since the material being handled is highly radioactive. In the light of subsequent experience, it is clear now to the EDF and the AEC that the cost of this reprocessing has heretofore been grossly underevaluated: The estimated costs have had to be multiplied by factors of three or four in terms of real value over the following 5 or 6 years. The resultant figure today is Fr 4,000/kg.

Jacques Baumier for his part considers it the better part of prudence to use a figure of Fr 4,200 (the Peon Commission worked on the basis of Fr 1,500/kg as of 1 January 1977...).

Adding together all these fuel cycle costs, the result is a mean overall fuel cost of 4.17 centimes/kW-hr for the year 1981, which compares favorably with 15 centimes for coal and 43.43 for residual fuel, based on current crude oil and coal prices. Based on these different parameters, the total actualized potential production cost for the plant is calculated; that is, the investment cost as of the time it is put into service is added to the actualized potential total of fuel expenditures, in constant francs, using the Plan's actualization rate of 9 percent annually, and the sum is divided by the actualized potential mean operating time to obtain the production cost per kW-hr, which for the above cited nuclear plant is 15.69 centimes. Based on the currently known economic conditions for 1990, the economic superiority of nuclear energy is overwhelming, and the cost of a fossil-fueled plant for the production of energy is fundamentally unjustifiable. A similar calculation based on the economic conditions of 1973 resulted in an approximate equivalence between fossil-fueled and nuclear energy production. Coal may seem attractive, but considering French supply conditions this energy source is definitely more costly than uranium as a primary source of electric power production.

This profound change in conditions governing the production of electricity will make the nuclear more and more the national choice as an energy source, whose cost is certain to be freed of constrictions as world market prices for oil products continue to rise and whose competitiveness is bound to continue growing.

9399
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PROJECTS TO BUILD NUCLEAR POWERPLANTS DESCRIBED

Madrid LUZ Y FUERZA in Spanish May-Jun 81 pp 5, 7, 9

[Text] "We are convinced that the solution here and now entails nuclear energy." With this comment, made at the press conference held yesterday in Almaraz (Caceres) after the official opening of the first group of the nuclear powerplant, President Calvo Sotelo confirmed his government's steadfast intention of proceeding ahead, unhesitatingly, with the nuclear program called for in the National Energy Plan [PEN]. He subsequently stated that, with the visit to the Almaraz nuclear powerplant, "I wanted to underscore the importance that the government attaches to the execution of the National Energy Plan, and as part of it, to the nuclear plan."

Mr Calvo Sotelo also remarked that the Ministry of Industry and Energy would submit a new version of the PEN to reinforce the nuclear plan, in keeping with the new national energy circumstances. The head of the government asked the news media to help disseminate the information regarding the major safety measures for the nuclear powerplants, making them safe to construct anywhere because, he said, "The vigilance and security standards are extremely stringent. A few days ago, I swore in the Nuclear Safety Council, and we shall see to it that the safety measures, which are very demanding insofar as nuclear energy is concerned, are complied with."

When asked when the revision of the PEN will be made, President Calvo Sotelo noted that, included in the reasons prompting the revision of the Plan is the fact that the prices of crude have changed, and the situation must be geared to the new costs of oil. In this regard, he said that this revision might be submitted by the minister of industry and energy to the Cortes this coming September.

He was later asked whether his government is considering putting the nuclearization of Spain to a referendum and, specifically, the case of Lemoniz; to which Mr Calvo Sotelo replied that he did not consider it a topic to be put to a popular referendum. At another juncture, the president declared that the differences between the government and the opposition parties on the nuclear issue are not very great and that, in any event, "My government (he reiterated) will attempt to comply faithfully with the revised plan." He added: "I am greatly concerned about our delay."

These delays which the minister of industry regrets are causing, and have already caused enormous losses for the national economy; and these losses have had immediate repercussions on the electric companies building the nuclear powerplants. The very delay in this first group at Almaraz has, in the opinion of the president of Spanish Hydroelectric, the Marquis of Casa Oriol, imposed on that firm an impact of 3.7

billion pesetas during 1979, the date on which this first Almaraz group was scheduled to have gone into service.

This loss on the part of HE [Spanish Hydroelectric] must be multiplied by three, because, as everyone knows, the Almaraz powerplant is being built in equal proportions by HE, UE [Electric Union] and CSE [Sevillian Electricity Company]. But this impact sustained by HE that the president of Spanish Hydroelectric has mentioned to us was calculated at 8 billion in 1980, a figure also multiplied by three; which, of course, represents a considerable loss to the nation owing to the delay in the construction of this powerplant, for which the electric companies building it are certainly not to blame.

The benefit accrued to the Spanish economy by the entry into service of this first group at Almaraz is considerable because, if one estimates a normal use of its power, this group could produce 4.650 billion KWh per year, a production which, if this powerplant did not exist, would require a consumption of about 1.1 million metric tons of fuel oil in a plant of this type. If we consider the fact that a ton of fuel oil requires the treatment of 2 tons of crude, we find that the operation of the No 1 nuclear group at Almaraz will involve a savings of 2.2 million metric tons of crude per year, a volume of oil equivalent to 16 million barrels which, at the present price, represents approximately $550 million. But, even when this figure is cut in half, owing to the rest of the products of the refining, and subtracting the cost of the charges of nuclear fuel, if imported, the net economy to the nation in foreign exchange (Jose Maria de Oriol claims) would amount to $250 million.

All of this causes us to regret, with the president of the government, Spain's delay in the construction of the necessary nuclear powerplants, lags resulting from the difficulties that have cropped up in their construction, and from the misgivings of those who, with their erroneous action, have delayed these nuclear projects.

With the official opening of the first group at the Almaraz nuclear powerplant by the president of the government and the minister of industry and energy, the way has been paved for putting into operation the second generation of nuclear powerplants in Spain which, once they are in service, will represent a power of 6,555 megawatts.

The importance of putting Almaraz I into service lies not only in the substitution of 1.3 million tons of crude per year, approximately 27 billion pesetas at the current oil prices, but also in the fact that Spanish technology and the Spanish companies engaged in the construction of capital goods for the nuclear powerplants have come of age.

At the present time there are three nuclear powerplants depositing kilowatts into the system: Santa Maria de Garona, Jose Cabrera and Vandellos I, which together bring a total of 1,100 megawatts of power and which comprise the so-called first generation of nuclear powerplants. These plants were contracted for through the "turn-key" system, which means that, actually, the Spanish participation in engineering and manufacture was limited essentially to the construction work. In the total project, the Spanish participation amounted to 42 percent.

With the second generation of nuclear powerplants, the two groups at Almaraz, those at Lemoniz and those at Asco, in addition to Cofrentes, the "turn-key" type of contracting has been abandoned, and the electric companies, with the cooperation of the engineering firms, bear direct responsibility for the project. The technological training of Spanish industries and the quality control programs carried out have made it possible for the Spanish contribution in this second generation to amount to 70 percent of the total for the project. For the so-called third generation of nuclear powerplants, which include the groups at Trillo, Vandellos, Valdecaballeros, Sayago and Regodola, the initiation of companies with nuclear equipment for the manufacture of heavy components, as well as [words missing from text]

The Almaraz group,which has been officially opened, has a PWR reactor with Westinghouse technology, and a gross electric power of 930 MW. The preliminary authorization was granted in 1971, that for the construction on 29 October 1973 and the permit for provisional operation was issued on 13 October of last year. At the end of October the fuel was loaded and it reached criticality at that time. The period wherein it is anticipated that it can reach full power and supply a large volume of kilowatts to the system will be this summer. When the Almaraz nuclear powerplant is in full production, with an annual utilization of 6 million in power from each unit, it will supply 5.5 billion kilowatt hours to the system; which is equivalent to 1.3 million tons of oil per year, or to 13.750 billion cubic meters of water impounded per year.

This information gives a very clear idea of the enormous damage caused to the electric companies building Almaraz (HE, UE and CSE, in equal proportions); because the loss of nearly 3 years in the construction of the first group and, consequently, those caused to the construction of the second one, may be estimated at many billions of pesetas, if we reckon the fuel which the companies and the nation would have saved during that time.

The approximate cost of the two Almaraz groups will be on the order of 180 billion pesetas, and this powerplant is being constructed by Spanish Hydroelectric, Electric Union and the Sevillian Electricity Company, in proportions of a third, on their own account and at their own expense.

The Almaraz plant has been built in accordance with the practices, codes and standards that are in effect internationally for this type of facility. It has also incorporated the additional safety devices introduced by the authorities in the United States following the accident at the Three Mile Island powerplant.

The powerplant is beginning to deposit energy into the national electric system amounting to 400 KW, and it is expected that, in September, it will be generating electricity at the plant's total power. In 1982, the second unit, also for 932 MW, will go into operation.

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END

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21 October 1981

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 119

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21 October 1981

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 119

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CANBERRA ADMITS BREACH OF NABARLEK URANIUM MINE SAFETY

Perth THE WEST AUSTRALIAN in English 27 Aug 81 p 35

[Text] Canberra: The Federal Government made an extraordinary admission yesterday of the failure of its uranium policies, says Labor's urban and regional affairs spokesman, Mr T. Uren (NSW).

Mr Uren's comment came after a statement by the Acting Prime Minister, Mr Anthony, that environmental requirements at Nabarlek uranium mine had been breached.

Mr Anthony told Parliament that Queensland Mines Ltd told the supervising scientists on July 14 of the breach, which occurred during heavy rain on March 7.

Mr Anthony said that contaminated water was released from the site, but no samples had been taken so it was impossible to document the quality of the released water.

"I am informed that no environmental damage is evident from observations made to date," Mr Anthony said.

He said that mining companies were responsible for monitoring contaminants on site and that Northern Territory supervising authorities were responsible for inspecting and monitoring to ensure compliance with environmental requirements.

STRINGENT

Mr Uren said Mr Anthony and other Government Ministers had often said that uranium mining would be subject to the most stringent controls with full monitoring of its environmental effects.

Mr Anthony's statement showed that there had been a breach, that Queensland Mines had covered it up for four months and that there had not been proper monitoring.

"This admission shows up the emptiness of all the Fraser government's rhetoric about stringent controls," he said.

"Clearly there is no guarantee that the environmental disasters of the past will not be repeated in the delicate Kakadu national park and Alligator River region.

"It is particularly disturbing that, nearly six months after the spill at Nabarlek, the Government does not know how much radium was released into downstream waters.

HAZARD

"The second Fox report indicated that, even with the proposed running releases from the Ranger mine, radium could present a health hazard to Aboriginal people taking food and water downstream," Mr Uren said.

"Nabarlek is a very small and tidy mine compared with Ranger, which is still under construction, and the proposed Jabiluka and Koongarra mines.

"Environmental controls which proved inadequate at Nabarlek could well prove disastrous at the bigger mines."

CSO: 5100/7501

BRIEFS

BEVERLY LEACHING PLANT--The Petromin group of companies is still negotiating over production lease terms for the Mereenie oil and gas field with the Northern Territory Mines and Energy Department, the June quarterly reports show. There was a total expenditure of $694,700 but the only well drilled, Wallaby No 1 in the Amadeus Basin, was unsuccessful and converted to a water well. Petromin NL exploration expenditure for the June quarter amounted to $122,738 (previous quarter $164,037), while Oilmin NL spent $266,874 ($198,185) and Transoil NL $305,087 ($228,813). Follow up drilling would be carried out in due course on several structural leads revealed during 1150 km of seismic survey in the Amadeus Basin, directors said. Work leading up to the installation of a pilot in situ leaching plant at the Beverly uranium prospect in South Australia continued while unsuccessful routine exploration work on various mineral leases was carried out. [Text] [Brisbane THE COURIER-MAIL in English 26 Aug 81 p 18]

NUCLEAR SHELTER BAN--Sydney--The New South Wales Building Workers' Union has banned construction of nuclear blast and fallout shelters. The union secretary, Mr Stan Sharkey, yesterday called the marketing of such shelters at $12,000 each "a blatant confidence trick which specifically seeks to exploit, for profit, the current dangerous build-up of the nuclear arms race." He said the only real protection for people was application of the United Nations' policy of outlawing nuclear weapons. Mr Sharkey said the union had expressed grave concern and condemnation at the commercial sale of such shelters, which were being advertised in newspapers. "We have decided to place a total ban on the construction of any such nuclear blast and fall-out shelters and intend to seek the support of the trade union and labor movement generally," he said. "All known scientific evidence factually establishes that there can be no guarantee of survival from a nuclear blast." Mr Sharkey said physicians at the Harvard Medical School in Boston in the United States had declared that bomb shelters in the city would give no protection in the event of a nuclear blast. [Text] [Brisbane THE COURIER-MAIL in English 27 Aug 81 p 12]

CSO: 5100/7501

NUCLEAR PEACEFUL AIMS REAFFIRMED, OTHER USES POSSIBLE

Sao Paulo FOLHA DE SAO PAULO in Portuguese 28 Aug 81 p 55

[Text] Brasilia--While the superintendent of the NUCLEBRAS Engineering Corporation (NUCLEN), Ronaldo Fabricio, pledged yesterday at a seminar in the University of Brasilia that "Brazil does not plan to use the plutonium resulting from the reprocessing of uranium to build the atomic bomb because the nuclear program has peaceful aims," the superintendent of the Brazilian Nuclear Corporation (NUCLEBRAS), Colonel Sebastiao Valadao, speaking in Sao Paulo, admitted the theoretical possibility of the use of reactors for purposes other than generating electricity.

Participating in the First Energy Panel sponsored by the Culture, Science and Technology Committee of the Sao Paulo Legislative Assembly, Colonel Valadao made the following statement during the debate on the Brazilian nuclear program: "Any industrial technical activity is ambivalent because the same refinery that distills oil for automobile use produces fuel to operate military vehicles." And he concluded: "Even the cows that produce meat also produce leather for soldiers boots."

At the same panel, which is being held in the Legislative Assembly, former Federal Deputy Dagoberto Sales defended the nuclear program under way in Brazil, arguing that studies of a historical series based on the growth of the supply of energy during the last 70 years makes it possible to project the growth of demand to an annual rate of 11 percent. Thus, he said, "we will reach the year 2000 with a supply need of about 200 million kilowatts."

But, since the potential inventoried by ELETROBRAS indicates a utilization of 203 million kilowatts of installed power--of which, only 106.5 million KW would be represented by firm power--"the time has come to begin the commercial operation of the thermo-nuclear plants, especially benefiting the Southeast Region."

Former Deputy Euzebio Rocha, on the other hand, who also debated the Brazilian-German nuclear agreement, proposed its revision with the broad consultation of the country's scientific community and the deactivation of the plan for construction of [nuclear] power reactors in favor of hydroelectric power plants.

According to Rocha, it is absurd to think that the demand for electric energy will grow at the rate of 11 percent per year, the position taken by Sales. After all, the secretary of the National Energy Committee admitted a 10 percent idle capacity in the hydroelectric sector and that percentage was recently rectified by the vice president of the republic, Aureliano Chaves, who indicated an actual idle capacity of 25 percent. "Therefore, it is absolutely absurd to build reactors for the production of nuclear-powered electricity at costs two or three times higher than what we can obtain from our available and renewable hydroelectric sources," he concluded.

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IPEN TO RECEIVE MORE ENRICHED URANIUM BY DECEMBER

Sao Paulo FOLHA DE SAO PAULO in Portuguese 29 Aug 81 p 16

[Text] The superintendent of the Energy Research Institute (IPEN), Hernani Amorim, revealed yesterday that that agency will receive five fuel elements of uranium enriched to 20 percent for a total of 5 kilograms by the end of this year. The elements will be supplied by the German Nuken firm with material originally produced in the United States.

The uranium will be used to recharge IPEN's research reactor installed in 1957 and which presently generates 2 MW of power (one-fifth of the installed capacity). The uranium spent during the past 24 years of operation will be shipped to the United States, where it will be reprocessed in an operation designed to separate the fissionable material formed during the operation of the reactor.

According to the IPEN superintendent it is a swimming-pool reactor, used exclusively for research in nuclear physics and neutrons, irradiation of materials and training of personnel.

Up to now, IPEN has not had any difficulty regarding the storage of highly radioactive material (atomic waste) because the waste is made up of radioisotopes used in nuclear medicine and in the investigation of welds and metallic structures (gammagraphy). "For that reason," he said, "we only have elements such as radioactive iodine, potassium and cobalt, all with a (half-life) activity of less than 2 years."

According to Hernani Amorim, Brazil will not begin to have a problem with atomic waste until 1 year after the beginning of operations of Angra-I.

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IBQN OFFICIAL DISCUSSES SLOWDOWN OF NUCLEAR PROGRAM

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 10 Sep 81 p 32

[Text] Rio de Janeiro--Amaro Lanari Junior, director-superintendent of the Brazilian Nuclear Quality Institute (IBQN), an agency that provides evaluation services and expertise for the projects of the Brazilian Nuclear Corporation (NUCLEBRAS), the NUCLEBRAS Engineering Corporation (NUCLEN), the NUCLEBRAS Nuclear Plant Construction Corporation (NUCON) and Furnas, admitted in Rio yesterday that the government is slowing down the Brazilian nuclear program. However, Lanari could not say whether that was due to "a political decision by the government or an economic decision by Minister Delfim Netto."

The IBQN chairman mentioned two facts that indicate that possibility: inspections of projects and equipment in the nuclear sector were much greater last year. NUCLEN has not paid its bills to that agency for more than a month and NUCLEBRAS also has not settled its debts since May, indicating that that sector is suffering financial problems.

Amaro Lanari Junior explained that the initiative to establish the IBQN came from the Geisel administration a little more than 2 years ago but it is a nonprofit civil agency, with private legal status and administrative and financial autonomy. Its founders and members in the government sector are NUCLEBRAS, the Brazilian Electric Power Corporation (ELETROBRAS) and the Brazilian Industrial Quality Foundation.

Participating in that agency for the private sector are: the Brazilian Association for the Development of Basic Industry (ABDIB), the Brazilian Association of Electric and Electronic Industries (ABINEE), the Brazilian Association of Industrial Engineering (ABEMI) and the Brazilian Association of Engineering Consultants (ABCE). The following research and technology technical organs also participate in it: the Technological Research Institute (IPT), the Energy and Nuclear Research Institute (IPEN), the National Institute of Technology (INT) and the Institute of Weights and Measures, absorbed by INMETRO.

Functions

The purpose of the agency is to prepare, on request, analyses, tests and technical opinions and to follow up the plans, construction and operation of nuclear installations, their systems and components, with a view to safety and the reliability of those installations and the protection of persons and property. According to Lanari, the IBQN has not noted any irregularity in the government's nuclear sector projects, nor has it yet been asked to give its opinion as to whether a given area is advisable or not for the installation of nuclear plants despite the fact that it has 17 Brazilian and 2 German experts for that type of service. These experts work full time and have to have a minimum of 5 years of experience in quality control service.

The IBQN has a capital of 30 million cruzeiros and this year's budget is 260 million cruzeiros: 100 million pertain to services rendered, 85 million of government funds, and 75 million of advances by contracting agencies.

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CSO: 5100/2325

ARGENTINE GENERAL GUGLIALMELLI VIEWS BRAZILIAN PROGRAM

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 13 Sept 81 (section 8) p 1

[Interview with General Juan Enrique Guglialmelli, head of the Argentine Institute of Strategic Studies; date and place not given]

[Text] Argentine General Juan Enrique Guglialmelli said that "doubts persist in his country regarding whether Brazil is developing a plan for the manufacture of nuclear devices of a military nature." The general added that the anxiety has not been dispelled by the denials made by Brazilian Government officials or by the statements of President Joao Figueiredo himself." Guglialmelli, a retired major general, is known in Argentina as one of the strictest analysts of Argentine national and international problems, especially those related to national defense and economic and social development. Today he is head of the Argentine Institute of Strategic Studies. Guglialmelli was interviewed by the newspaper O ESTADO DE SAO PAULO about the possible plans Brazil and Argentina may have to build nuclear weapons.

Suspicion About a Parallel Program

Question: Do you believe that Brazil has any alternative plan of a military nature for its nuclear industry?

Answer: Unfortunately, I have serious misgivings about that subject. I worked on that matter and I can state that by the mid-1970's Brazil had decided to join the nuclear club. In 1976, I proposed in a book that in order to avoid mistrust between the two countries, overall negotiations be initiated to overcome the contridictions existing at the time. Among other matters, I pointed out the need to conclude a nuclear cooperation agreement to establish effective and reciprocal safeguards in view of the possible manufacture of nuclear devices even though they might be intended for peaceful purposes.

In view of recent events in that area, the facts seem to prove me right. I refer specifically to the charge made in July of this year by the important Brazilian newspaper O ESTADO DE SAO PAULO, charges which seem to have gone unnoticed in Buenos Aires despite their importance. The charges refer specifically to the arrival of Iraqi planes in Brazil to pick up enriched uranium for the operation of the Iraqi nuclear plant recently destroyed by Israel. But the charge made by O ESTADO includes a second point: the existence of a Brazilian secret plan which is allegedly being developed in institutes in Sao Paulo for the manufacture of a military device.

The charges of O ESTADO aroused lively debate. Brazilian Government officials, made all sorts of verbal denials, including the president himself, General Figueiredo, on the occasion of his visit to Lima.

Nevertheless, and despite all those denials, doubt remains. On that point, I agree completely with what the eminent physicist, Doctor Goldemberg, said in ESTADO DE SAO PAULO, and with the questions posed by the newspaper. I was left with a very serious and very grave suspicion centered on the possibility that Brazil may be manufacturing a nuclear device even if it is intended for peaceful purposes.

Question: If that plan, about which there seems to be evidence, does exist, what repercussion would it have on relations between Brazil and Argentina?

Answer: You touched on a really very important point. In the first place, because Argentina cannot remain aloof from the problem even though thus far there is no concrete information and despite the fact that we have information supplied by an important newspaper that has been denied by the Brazilian Government. But, I have already said, a suspicion persists, especially if we take into account Brazil's capacity to manufacture the device. In view of that situation, we Argentines have to consider the worst alternative, namely, that Brazil is developing a plan to build an atomic device. In view of that suspicion, therefore, Argentina will have to act.

As to how that plan can affect relations between the two countries, I can say in principal and for reasons of security, owing to the natural requirements of military strategy, Argentina cannot remain unconcerned.

At the same time, that situation may compel us to undertake the manufacture of a nuclear device. That would generate an arms race which is not in the interests of our respective peoples. We Argentines and Brazilians must exert our efforts in behalf of economic and social development and not in behalf of arms competition.

In addition, the manufacture of nuclear devices by Brazil does not only affect Argentina, it also affects other countries in the Latin American Southern Cone. I do not believe there are reasons at this time that would justify the construction of a nuclear device for peaceful purposes.

Criticism of Corpus-Itaipu Agreement

Question: A number of agreements signed between Brazil and Argentina have been in effect since last year, constituting what has come to be termed a "political-economic convergence." Would that convergence not invalidate your theory, basically because your analyses pertain to a spirit of competition between the two countries?

Answer: I want to stress, in the first place, that my arguments do not stem from the analyses of the contradictions between Brazil and Argentina but rather from the concrete facts pertaining to the security of my country. In the second place, the political convergence between the two countries seems to exist formally.

Nevertheless, I have some doubts in that regard. That convergence arises and revolves around an initial point: the Corpus-Itaipu agreement. I raised objections to that agreement in an article titled, "Yacireta-Corpus and Itaipu, Three Lost

Battles for Argentina and Now the Prospect for Argentina of Being a Junior Partner." I have serious doubts that the traditional and constant policy of Brazil will change substantially on the basis of those agreements. Brazil's objectives for 2000, as defined by General Golbery do Couto e Silva, consist in achieving the level of a world power, at the same time exercising a "manifest destiny" over South America and an "unavoidable responsibility" over Paraguay and Bolivia, as General Couto e Silva himself stated.

That led Brazil to pursue a policy that, if not exactly "expansionist," may be termed at least one of "pressure" on its neighbors.

In the agreements on Itaipu and Corpus, I did not find any compensation for what Argentina conceded. An example of that is the fact that Argentina makes a concession in the energy area in order for Brazil to improve its strategic prospects. Corpus is being built with a level of 105 meters, which was a Brazilian objective since 1974. In addition, it will facilitate the guaranteed power because it will practically imply a difference of level in relation to Itaipu. Thus, we agreed to the construction of the dams on the upper Uruguay, which are of the utmost importance to Brazil but not for Argentina. That fact not only has an energy aspect but also, because of the concessions made by Argentina, favors transportation from the northern between-rivers area to the port of Rio Grande do Sul, via the Yacui-Ibicuy canals, establishing competition with the Argentine ports on the Rio de la Plata.

Brazil Already Has Plans for Nuclear Submarines

I should point out also that, based on the agreements, it has already been announced that Brazil may participate in the exploration and utilization of the oil-bearing basins existing in our seas; that participation would be made through the association of Brazil with Argentine and foreign companies. In conclusion, I would say only that only the facts will tell us in the future if that convergence has actually become a reality.

Question: Considering that Argentina has and is developing concrete plans for the manufacture of weapons, is there not the possibility that there is an Argentine plan for the construction of nuclear devices?

Answer: Brazil already has concrete plans for the construction of nuclear submarines. I would say that the Argentine planes for the construction of more or less conventional weapons are those looked upon as natural for any country that needs a certain degree of logistic independence in the nuclear area, that is freedom of action.

I could respond by using the statements of the president of Brazil himself in When General Figueiredo was asked about the aspects of his country's military industry, indicating that Brazil reportedly ranked sixth in the world in that area, he maintained with very good arguments--and even demonstrated--that Brazil is really very far from the high levels achieved by other countries in that area. In comparison with Brazil's plans, Argentina's plans regarding the manufacture of weapons are more modest, so that if Figueiredo maintains that Brazilian plans are below the levels attributed to it in that area, Argentina is in an even lower position.

Our country is in the process of beginning the manufacture of military tanks but the Brazilian tanks are already fighting in the war between Iran and Iraq and they do so very successfully. To give another example, Argentina has begun to establish a submarine fleet but Brazil already has very concrete plans for the construction of nuclear submarines. Those examples shatter the argument that Argentina has embarked on an ambitious program of building conventional weapons.

"I Say That Argentina Does Not Have Plans To Build the Bomb"

As to the question of whether my country has a plan to build a nuclear device even though intended for peaceful purposes, I say No, emphatically, No. I understand the apprehension of the Brazilians but Argentina is not working on a plan of that nature. Among the arguments that I can present to justify my certainty in that regard is the consistency of our behavior. Argentina had had successive military governments and if it had embarked on a plan for the manufacture of nuclear weapons, we would already have had them for some time.

Furthermore, our equipment to work in that field was purchased abroad and it is all subject to the safeguards and under the regulation of the International Atomic Energy Agency. In addition to which, we do not have any secret installations, something that is also very well known.

We should also take into account the fact that if it were Argentina's intention to build nuclear weapons, we would have to suspend our nuclear program aimed at peaceful purposes in order to channel all of our human, technical and basically financial resources for that purpose. Those resources are currently directed toward the energy program conducted by the National Atomic Energy Commission.

Another reason is that the manufacture of an atomic device is not justified on our part. For the time being, we do not need it for peaceful uses, nor do obligations or imperatives of a strategic or political nature require it. The Argentines need all their resources for the economic and social development of the country.

The Brazilian nationalists maintain that in order to have power status, it is necessary to have nuclear status and have nuclear weapons. I maintain that it is possible to be a power in the field of military industry without having nuclear devices, as is the case of Germany and Japan. India, which is a different case, has nuclear weapons and, in the meantime, it struggles with underdevelopment and does not have big-power status.

The Right To Build Atomic Weapons

Question: Can Brazil and Argentina reach the level of technological development that would permit the construction of nuclear weapons?

Answer: I want to make it clear, however, that from every point of view--and this also applies to Brazil--it is necessary to maintain the possibility that, if the moment arrives when the needs so require, both Argentina and Brazil have the capacity to build nuclear devices. In connection with the commitments they contracted internationally in the nuclear area, both countries reserved the right to build nuclear devices. But that will only be done if the needs so require.

Finally, to confirm what has been said, I reiterate that at the present time, Argentina does not have any alternative plan to manufacture nuclear devices, not even for peaceful purposes.

Question: In your opinion, is there unanimity among Argentine policy-making circles, especially in the armed forces as the policy-making axis at the present time, with regard to the nature of collaboration between and Argentina in the nuclear area?

Answer: I do not know what is the opinion of those circles. First, because I have not asked them. And secondly because, due to the present system installed by the junta of armed forces commanders, the policy-making circle is very complex, so I do not know if unanimity which, furthermore, is difficult to achieve does exist.

If I may give my opinion, I am in agreement with nuclear cooperation within the framework of a total and overall agreement that will insure equal benefits for both sides. That takes us to the crux of the problem, which is none other than of the Argentina-Brazil relationship. I wrote about that relationship, maintaining, as I do now, that with reference to their relations with the Brazilians, the Argentines have three courses or options. The first is to accept the role of junior partner in view of the different degrees of industrial development achieved by the two countries. The second option is to consider the contradictions with Brazil as not capable of being overcome and, in that case, assume that an armed conflict is inevitable. The third alternative is for Argentina and Brazil to achieve a relationship of complete friendship, maintaining a convergence of political attitudes based on the equality of both sides.

My conclusions with regard to the possible manufacture of nuclear devices and cooperation in that field is that, in view of current conditions and the suspicion so well-founded for Argentina in view of the charges made by O ESTADO DE SAO PAULO --charges that have not been sufficiently clarified--our country and Brazil should complement the nuclear agreements with a mutual security agreement with reference to the manufacture of nuclear devices. Those advices could only be justified if intended for peaceful purposes.

I want to add also that the alternative of being the junior partner of Brazil is not a Brazilian problem; to achieve a more important position, that country relies on the degree of development achieved by its industry, especially heavy industry.

It is an Argentine problem and it will depend on us to achieve a new position in the area of economic-social development and to be able to assert the third alternative that I mentioned for managing the relations with Brazil: friendship, political convergence on an equal footing, to thus serve our respective peoples and not to serve any factors alien to the concrete interests of Brazil and Argentina.

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FURNAS GUARANTEES OPERATION OF ANGRA-I IN DECEMBER

Rio de Janeiro JORNAL DO BRASIL in Portuguese 13 Sep 81 p 37

[Text] Furnas has guaranteed that the first Brazilian nuclear plant, purchased from the U.S. Westinghouse Company in 1972 and installed in Angra dos Reis, will begin to produce the first 10 percent of its 620,000 kilowatts. The National Nuclear Energy Commission (CNEN) is supposed to authorize the charging of the reactor nucleus with the fuel elements by 15 October so that the plant will begin its commercial operations.

The president of Furnas, Licinio Seabra, believes that the authorization will be granted because the plant currently meets all safety requirements called for by the CNEN. A representative of the International Atomic Energy Agency (IAEA), responsible for supervision of the equipment, technology and nuclear material used in the plant, will be present at the charging of the reactor nucleus.

What It Cost

Seabra said that the charging of the reactor nucleus with the fuel elements is similar, by analogy, to the closing of a hydroelectric dam and the passage of the water to begin turning the turbines. When it receives the fuel elements, the whole system of the plant will begin operating to generate atomic energy, with the aid of the specialized personnel trained abroad to operate the plant.

But after the nucleus is charged, there will still be one of the principal tests of the plant: the critical state test. That consists of the production of heat by nuclear means, according to Seabra. Once that test is approved, the machinery will receive the load and begin to generate the first nuclear kilowatts at an initial phase of 10 percent until it reaches 100 percent. If everything is normal, the generation level of the plant will remain at 80 percent during the whole period of operation.

However, a date has not yet been set for its formal inauguration because, according to Seabra, it will function as a test even when operating commercially until it reaches the "priority one" total safety level, he observed.

The Angra dos Reis Number 1 plant has already cost Furnas $1.3 billion, according to its president. Consequently its cost per installed kilowatt now stands at around $2,000. Its initial price, when it was purchased 10 years ago, was $320 million at a price of a little more than $400 per installed kilowatt.

The total spent by Furnas on the nuclear plants--one purchased from Westinghouse and two, from the Germans--during the last 10 years is 199,815 million cruzeiros. Thus far, the two German plants have cost 66,605 million cruzeiros ($700 million); the remainder was invested on the first plant.

Recharge of Number 1

With regard to the recharging of Angra-I--which will have one-third of its fuel changed in 1983 if it begins to operate at the end of this year--Seabra said that there is still time for negotiations. According to him, what is happening between Brazil and the United States is a political impasse difficult to resolve.

Under the contract between Furnas and the U.S. Government, the Angra-I plant was supposed to receive enriched uranium from the United States until the end of its uselul life. It so happens that from the Carter to the Reagan administrations, U.S. laws regarding transactions of nuclear meterial between the United States and other countries have become stricter. Thus, to supply enriched uranium, the United States is demanding broad safeguards equivalent to the Nonprofiferation Treaty, which Brazil did not sign because it considered it "discriminatory."

Seabra believes that everything will be resolved diplomatically. It is not in the interest of Brazil to denounce that contract with the United States because it would be less one important country in the nuclear area for future negotiations. And it would not be in the interest of the United States to bring about a breaking of that contract because the U.S. Westinghouse Company will have to remain providing technical assistance to the plant that it sold to Brazil with only an 8 percent national participation of goods and services.

Seabra said also that Brazil has options to acquire enriched uranium in another country and send it to Germany where the fuel element would be made under an agreement existing between the Brazilian Nuclear Corporation (NUCLEBRAS) and Germany companies. The enriched uranium the United States is supposed to supply will also go to Germany, which is responsible for transforming it into fuel. For that reason, he does not consider not having the fuel element for recharging the Angra dos Reis Number 1 plant a threat. He believes, however, that it is already time to begin negotiating for the recharge.

Furnas is asking for 170 billion cruzeiros for investment next year, 85 percent of which is for the installation of five circuits of the Itaipu plant transmission lines: two direct current and three alternating current. Each line will be about 1,000 kilometers long. Included in that percentage also is the cost of the converters and inverters, which transform the frequency of the Itaipu plant turbines from 50 to 60 cycles. The lines should be carrying power to Sao Paulo in the next 2 years. The Furnas budget this year was 100 billion cruzeiros.

Odebrecht Comes in With Know-How

The Norberto Odebrecht Construction Company (CNO) is going to participate in the Angra dos Reis Nuclear Plant Number 3 installations with the transfer of the know-how it acquired in the construction of Angra dos Reis plants Numbers 1 and 2. This item at least is being studied by the NUCLEBRAS Nuclear Plant Construction

Corporation (NUCON), a NUCLEBRAS subsidiary responsible for the installation of the Angra dos Reis plants.

The CNO is going to transfer its know-how to the future contractor that wins the bid for construction of plant Number 3. It is not known, however, what type of contract will be made between the construction company and NUCON, which said in a press release on 31 July that it had broken the contract with the Norberto Odebrecht Company for construction of the plant.

Philosophy

According to sources in the sector, the Norberto Odebrecht acquired know-how in the construction of nuclear plants through the German construction company, Hotchief, which is known in that coungry as the builder of nuclear plants. Thus, some analysts have said that it would now be very difficult to definitely keep that construction company out of the plant Number 3 project. Some have even said that the Norberto Odebrecht Company will participate actively in the infrastructure work and the contractor that wins the bid will take care of the plant superstructure.

On 31 July, Ambassador Paulo Nogueira Batista called the press to announce that the construction company could not participate in the bidding for construction of plant Number 3 because of a question of philosophy.

It is known, however, that it would be difficult for the contractor that wins the bid to initiate a project such as that of a nuclear plant without having to purchase know-how abroad. It is for that reason thet NUCON wants to associate itself with the CNO to lower the costs of plant Number 3. Another important reason for that is that the construction company will be at the same project site building plant Number 2, working under a unitary price type contract.

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PHYSICIST QUESTIONS JUSTIFICATION, VIABILITY OF PROGRAM

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 11 Sep 81 p 29

[Text] After all, what could justify the Brazilian program today? The question remained unanswered yesterday after physicist Jose Pinguelli Rosa of the Brazilian Physics Society gave his testimony before the State Investigating Commission on the installation of nuclear plants in the state of Sao Paulo. One by one, Pinguelli questioned the arguments which were presented at the time as justifying the Brazilian nuclear agreement.

The physicist, for example, questioned the argument that 60 nuclear plants would be needed by the year 2000 to generate 75,000 megawatts of energy, essential to take care of energy demand by the end of the century. He does not believe that the demand estimated by NUCLEBRAS is correct and cited studies by the government itself that today refute past forecasts. Pinguelli Rosa also questioned the argument to the effect that Brazilian hydroelectric potential is only 100,000 megawatts (given as an argument by NUCLEBRAS at the time the nuclear program was launched, he said). The physicist pointed out that official estimates currently forecast a potential of approximately 213,000 megawatts.

With regard to the other statement by NUCLEBRAS (that it would be impossible to bring electricity from long distances), the physicist pointed to Itaipu and its energy "a large volume of which will be transmitted to Sao Paulo, which is 900 kilometers away." The other argument--that a nuclear kilowatt would cost $500--was also rejected by Pinguelli Rosa: "Everybody knows that the cost per nuclear kilowatt today is $3,000.

It is on the basis of these wrong forecasts that the physicist believes the government "should already have noted" that the pace it plans to impose on the nuclear program may be based on "false premises." And there is no reason for so much haste: "The Brazilian nuclear program can be slowed down considerably without problems of energy supply," Pinguelli Rosa declared.

He considers it rash to state that Brazil will never need nuclear energy, "just as it is to say that nuclear energy is essential for the country." Pinguelli also questioned the viability of the Brazilian reprocessing plant "because of the technology." He said also, with a certain amount of sarcasm, that a reprocessing plant is only economically justified if it is intended to extract plutonium from the irradiated uranium, "which has two purposes: being used as fuel in fast-breeder reactors, or in military devices."

The second guest, Professor Luis Carlos Menezes of the University of Sao Paulo Institute of Physics and member of the Brazilian Physics Society denounced the "illegal way" in which the program was established, not only because it was begun without the knowledge of the nation but also because the people were not consulted.

The government agencies, he said, sought to act in such a way as not to inform the population of the risks of installing reactors in Brazil" "What has been shown so far has been some advantages only on the level of increasing energy production, while the safety part was totally forgotten" observed the professor.

In the debates which proceeded with the participation of two opposition deputies and some environmental protection organizations--nobody showed up from the Social Democratic Party bloc, the majority bloc in the State Investigating Committee--the central problem was how can the scientists participate in government decisions on the problem of nuclear plants in addition to the pressures that are normally exercised by scientific societies.

The debaters complained that there was no specific legislation on nuclear plants, contrary to the situation in other countries, and it even leaves an individual affected by a [nuclear] accident without any legal basis to take action to demand his rights. In addition to condemning the way Jureia Beach in Peruibe was chosen without any consultation with the state, Professor Menezes warned of the ecological damage to the area which today is the reproduction and spawning base for a large number of fish and one of the areas to be preserved at the request of the United Nations.

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COLOMBIAN PRESIDENT CITES INTEREST IN ACQUIRING TECHNOLOGY

Rio de Janeiro JORNAL DO BRASIL in Portuguese 5 Sep 81 p 14

[Text] Sao Paulo--President Julio Cesar Turbay Ayala said that Colombia is interested in acquiring Brazilian nuclear technology. He considers that one of the fields where bilateral cooperation becomes easiest. "We want technology for peaceful purposes and we can study the possibility of acquiring power reactors in order to be able to learn and train our technicians," he said.

The Colombian president was at the Federation of Industries of the State of Sao Paulo. He departed from the prepared speech and in extemporaneous remarks called for the union of Latin America around a process of effective integration that will give it a strong voice vis-a-vis the other countries and communities. In the bilateral area, he invited the businessmen to form a joint commission "to engage on a permanent basis in studying ways to facilitate the intensification of relations between the two countries.

Weapons and Atoms

In an interview, Turbay Ayala considered nuclear technology important to render services to humanity. A few minutes earlier, speaking to the businessmen, the Colombian chief of state pointed out that his country has huge uranium reserves; however, during the interview, he did not want to reveal their extent "because it was a strategic material."

Nuclear cooperation, provided for in the agreement signed during President Figueiredo's visit to Bogota but only now highlighted by Colombia, was set by President Ayala within a broader framework of collaboration which includes the joint exploitation of Colombian coal and other materials.

The president showed that Colombia is interested not only in Brazilian technology, more suited to his country than advanced technologies, but also in the entry of capital.

"The members of the government open the road, establishing the framework and it behooves the private sector to go down that road, taking experience, technology and capital to achieve development," he said.

He admitted the possibility of acquiring Brazilian arms, especially training planes for the armed forces.

Most of the Colombian president's statements were devoted to inviting the countries of Latin America and the Third World in general to assume a more consolidated position vis-a-vis the developed blocs. He believes that Latin America must comit itself to an integrationist process that will enable it to speak as one equal to another.

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BRIEFS

IBQN MONITORS PLANT CONSTRUCTION--The superintendent of the Brazilian Nuclear Quality Institute (IBQN), Amaro Lanari, Junior, said yesterday that the agency is in a position as of now to inspect and investigate the safety and quality of construction of all nuclear plants in the country. The institute was created 2 years ago by the Ministry of Industry and Commerce, the Brazilian Nuclear Corporation (NUCLEBRAS) and several associations representing the industrial sector, and since its establishment it has been organizing for this purpose. IBQN director Jose Guilherme Limeria Bittencourt explained the institute is going to sign service contracts with the National Nuclear Energy Commission (CNEN), the industrial companies that manufacture equipment for the nuclear plants and NUCLEBRAS. Its inspectors will monitor the manufacture of the equipment and its installation in the plants. It can refuse certification to machinery and equipment that is not manufactured in accordance with the safety and quality standards specified in the agreement. [Text] [Rio de Janeiro O GLOBO in Portuguese 10 Sep 81 p 22] 8711

URENCO URANIUM FOR ANGRA 1--Beginning next year, the URENCO (an FRG-British-Dutch consortium for the enrichment of uranium) will begin supplying 11,800 kg of slightly enriched uranium to Angra 1 for 20 years, that is, until the year 2002. The understandings have already been reached among the Governments of Brazil, the Netherlands, Great Britain, and the FRG, but the official publication will be made in November when Foreign Minister Saraiva Guerreiro visits Great Britain. According to diplomatic sources, the agreement with URENCO has brought a "tremendous political relief" to Brazil, because it eliminates Brazilian dependency on the United States, so far the exclusive supplier of uranium tothat nuclear plant. Westinghouse must supply uranium to Angra 1 as of 1982, but the U.S. Government has been exerting pressure, imposing the overall IAEA (International Atomic Energy Agency) safeguards. The understanding between Brazil and URENCO is in keeping with the cooperation agreement signed in 1978 by the four countries and includes special safeguard clauses. The plutonium resulting from the used enriched uranium, for example, will be stored in an international deposit. [Text] [PY282129 Sao Paulo FOLHA DE SAO PAULO in Portuguese 27 Sep 81 p 1]

CSO: 5100/2008

CIEN REPRESENTATIVE CITES NEED FOR NUCLEAR PLANT BY END OF 1990'S

Santiago EL MERCURIO in Spanish 13 Sep 81 p 1 Section C

[Text] "By the end of the next decade, Chile will need a nuclear power plant (with the capacity to supply electricity for all of Santiago) if power requirements continue to increase at the present rate and if comparative costs make it preferable to hydroelectric and thermoelectric solutions." That statement was made to EL MERCURIO by nuclear engineer Fritz Hinzner, who was recently named to represent Chile on the Inter-American Nuclear Energy Committee (IANEC), an organization of the OAS.

The nomination of Hinzner (47 years old, married, with 3 daughters) was no surprise in our country's scientific circles, since he was the prime mover, builder, and director of the La Reina nuclear reactor, and until 1980 he was among the approximately 40 high level specialists who, with 250 other professionals, work on the Chilean Nuclear Energy Committee.

He said that the IANEC is a technical committee which coordinates regional efforts in the field of nuclear energy, "for peaceful purposes, obviously." He said that the organization studies possible applications for the resource in fields of agriculture, medicine, and hydrology, among others, as well as training specialists and preparing mutual assistance and exchange programs in Latin America.

Power Reactor

Refuting the general belief that a nuclear power plant is somehow associated with the production of atomic bombs, the scientist, who is a University of Chile graduate with a doctorate from Stanford University in the United States, stated that the two matters are not related in any way. He said that while the technique for producing weapons based on nuclear fission is a variant of atomic science which governments handle secretly at the government and armed forces levels, a nuclear power reactor's only purpose is to produce electric power.

He indicated that, in general, a nuclear power plant is very similar to a thermoelectric power plant. "The only difference," he said, "is that while the latter burns coal, the former generates heat by means of nuclear fission in the reactor."

He said that, compared to the La Reina and Lo Aguirre reactors which have a potential of 5 megawatts and are used only to produce radioactive isotopes for medical and industrial use, the most modest nuclear power plant produces up to 600 megawatts (600 million watts) and at the present time costs at least $1.2 million.

He stated that the installation of such a plant in a country like Chile--which still has considerable hydroelectric and coal resources--would only be advisable when the cost became comparable. He recalled that hydroelectric plants like those to be installed in Colbun are becoming more and more expensive and estimated that perhaps in the next decade the nuclear solution would turn out to be the most advantageous. "The only problem," he said, "is that while the cost of operation in the first case is minimal, it is much greater in the nuclear plant, and therefore, cost per kilowatt-hour is greater."

Uranium

He noted that a power plant consumes about 10 tons of uranium per year (the present cost is $30 per pound) and said that although Chile does not have any deposits of that metal, "there is no problem getting it today." He said that uranium is neither as expensive nor as scarce as was believed some years ago, and that there are large deposits in the United States, Canda, South Africa, the Soviet Union, and Australia. He remarked that, by using various techniques that have been developed, it is estimated that the world has enough uranium to last at least until the year 2050.

He said that by then it is expected that the technology of nuclear fusion of hydrogen isotopes will have been perfected and then the world will have an inexhaustable source of energy.

Nuclear engineer Fritz Hinzner, who built the reactor now operating in La Reina, predicts that Chile will need a nuclear power plant by the end of the next decade if annual increases in electricity consumption continue.

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IRAQ

QUESTION WHETHER OSIRAK MAY HAVE ACHIEVED IRAQ BOMB SOONER

Duesseldorf ATOMWIRTSCHAFT ATOMTECHNIK in German 8 Sep 81 No 8-9, pp 462-464

[Text] The raid which Israeli aircraft carried out on 7 June 1981 against the Osirak Research Reactor (Tamuz-1) which had been built by France at the Iraqi Nuclear Research Center in Tamuz near Tuwaitha, raised a series of questions which are of worldwide significance above and beyond relationships between the two participating countries and the situation in the Near East concerning the policy of nonproliferation of nuclear weapons. Two questions are at the focus here:

1. Would Osirak really give Iraq an opportunity to make an atomic bomb, as Israel maintained to justify its operation?

2. Did international nonproliferation policy and its safety control fail in the case of Iraq, as implied in the Israeli raid?

This second question is taken up by the article--following this commentary--by the deputy general manager of the main department of safety control in the IAEO, H. Gruemm.

Regarding the first question, one must today start with the assumption that one probably cannot prevent a state, which wants to build an atomic bomb, from doing that without interferring in its sovereign rights. The question must therefore more specifically be worded in the following manner: to what extent would Iraq--by virtue of Osirak--have come closer in terms of time and expenditure to the atomic bomb than any other country of comparable development level--or, in short, to what extent would Osirak have shortened the way to an Iraqi atomic bomb?

We want to use three criteria to be able to judge this in the light of the technical facts which have become known:

Experts and knowledge,
Technical facilities and
Fissile material.

Experts and Knowlege

Iraq has since 1968 been operating a two-MWth research reactor IRT-2000 supplied by the Soviet Union. This means that knowledge concerning reator operation and handling radioactive materials as well as the technical-physical and mathematical background have been established for the past 13 years on the basis of training given by the Soviet Union. Moreover, the training of 600 experts in France and the presence of 150 mostly French experts in Iraq would also seem to suffice for the operation of the hot laboratory and of reactors even if one does not peg the term "expert" too highly. But it is rather improbable that this personnel includes experts in processing, actinide metallurgists, nuclear engineers, and specialists with knowledge in making atomic weapons. Although the number of experts thus would seem to be greater than in a comparable other country having a research reactor, there are probably no key experts here for weapons development.

Technical Facilities

At the time of the raid, Iraq had three reactors:

IRT-2000, a light-water tank type with 2 MWth output and a fuel enrichment of 10 percent, 36 percent, and 80 percent U-235; delivered by the Soviet Union in 1967.

Tamuz-2, which corresponds to the French Isis Reactor in Saclay; a critical arrangement with 600 kwth which contains 4-7 kg of U-235 in a 93-percent enrichment. The fuel was briefly irradiated and after the first air raid on 30 September 1980 it was moved to the research center.

Tamuz-1 (Osirak), which corresponds to the French Osiris Reactor in Saclay, with a standard output of 70 Mwth (maximum 70 Mwth) and about 15 kg U-235 with 93 percent enrichment. The reactor core however has not yet been installed (Figures 1-4).

Iraq furthermore has the following:

A hot laboratory consisting of three cells which was ordered in Italy in 1978 at a price tag of DM 2.5 million. But, in terms of volume, it is limited to handling at most gram quantities of radionuclides;

Some general laboratories for nonradioactive metallurgy, radiation protection, and biology.

This entire equipment likewise--compared with a corresponding other country--is rather comfortable, especially regarding the measurement possibilities with the underground canal which, following exactly the French model, connects the Tamuz-1 and Tamuz-2 reactors. It would have been entirely possible technically and perhaps also within the total construction cost of the center--which come to $300 million--to provide stronger protection for these facilities against air raids. Here, the general international discussion on nuclear installation safety against attacks from the outside could have offered an entirely unobtrusive occasion.

Fissile Material

Concerning the question of fissile material, the need for a nuclear weapon, the inventory of fissile materials in Iraq, and the question of breedable fissile materials are of importance.

(a) Need for fissile materials for nuclear weapon. The critical masses for a nuclear weapon in the form of unreflected balls of metal with the particular maximum density for fast neutrons are 44 kg for U-235 and 10 kg for Pu-239. One must therefore start with the assumption that, on the one hand, the necessary quantities are greater on account of the processing losses and the fact that conditions during the ignition of the weapon are not ideal; on the other hand, the necessary quantities can be cut roughly in half with reflectors and extreme pressures during ignition. It is especially this latter technology however which presupposes nuclear weapons tests and an extremely highly-developed technique in this specific area on whose dissemination outside the United States nothing has become known so far.

(b) Inventory of fissile materials in Iraq. As we said before, there were 7 kg, 93-percent enriched U-235 at the reactor core of Tamuz-2 (Isis). Because of irradiation, they are currently not accessible without complete chemical processing. For Tamuz-1 (Osirak), about 72 kg U-235 had been ordered but only about 13 kg had been delivered. The share out of the IRT-2000 reactor core, which has 80 percent enrichment, is small and besides highly irradiated.

After processing of all existing nuclear charges, we would have about 20 kg of U-235 for whose utility in weapons the above-mentioned restrictions apply. Because, according to French data, it had been planned that Iraq should never have more than 25 kg of U-235 available simultaneously in the country, it would be impossible to make a nuclear weapon in this fashion.

(c) Breedable fissile materials. In the cores of all three Iraqi reactors, plutonium is generated during operations. Because of the low share of U-238 in the fuel, however, they get only 6 percent of the quantity which is generated in light-water reactors with the same output. The plutonium furthermore is so heavily contaminated by the heat-supplying Pu-238 that no weapon could be made with it according to present-day knowledge.

This means that the people in Iraq would depend on breeding processes outside the reactor cores or their fuel elements. All three reactor cores are compact and therefore have poor cooling properties which could be improved only through considerable remodeling of the entire plant. If, as the extreme case, we assume a systematic sustained breeding operation at Tamuz-1 with 40 Mwth and in each case 30 percent burn-up in the reactor core, then, depending upon the arrangement in a breeder casing of 2,000-4,000 kg U-238, one would reach the 10-kg-Pu limit after 1,200 days at full load. Because of the necessary reloading, that would take 4 years, in each case, with one new Osirak core per year.

The idea that one could, each time in 3-4 days, which are between the announcement and performance of a semi-annual inspection by the IAEC, remove this highly-radioactive breeding zone which weighs tons and make it disappear without a trace, seems quite unrealistic. Even then one would still have to have a processing plant roughly of the kind of the WAK [Nuclear Fuel Reprocessing Plant] in Karlsruhe in order to get the plutonium pure, which would take about another half year. Then it would have to be converted into shaped metal bodies in a likewise rather complex and risky technology.

The much-mentioned underground cavern--meaning probably the neutron tunnel between Tamuz-1 and Tamuz-2--would, in case of filling with depleted uranium in the breeding gain for plutonium, be at least 10 times more unfavorable than a breeding jacket surrounding the reactor core which however would immediately be discovered. A laboratory for plutonium separation would make no sense in this "cavern" and could not be placed there at all to begin with in view of the space requirements.

Time Aspects

Even if one assumes that the procurement of a quantity of fissile material suitable for weapons could be achieved in the existing and now known installations in Iraq, one can nevertheless say with some certainty that this would take about 5 years. This is also roughly the time span which any other country with a comparable technical background would need if it were to build a graphite reactor, especially if it were intended for the procurement of weapons material, with 20-40 Mwth and a primitive plant for the processing of natural uranium. The financial and technological efforts here for such a solution would amount to barely more than half of that which Iraq has spent so far.

Conclusions

Technical facts which have become known thus do not support the assertion that Iraq could have shortened the way to its own atomic bomb with the help of Tamuz-1.

The Israeli arguments in support of the air raid otherwise however do not seem to hold water either. At the time of the bombing raid, neither of the two Tamuz reactor cores had been installed and this is why the fissile material remained preserved in the form of fuel elements--which were the target of the attack 2 years ago in Toulon in France. There was also a risk of contamination, although Tamuz-1 had not yet gone into operation--even though that risk was on the whole comparably very low. In the same town we at any rate have the long-operated IT-2000 with its relatively large reactor core. Thus, the choice of the timing for the attack was rather unfavorable from the technical viewpoint.

One furthermore of course cannot rule out the possibility that Iraq, like other countries in critical areas, with or without its nuclear research center, in 4-5 years might carry out its intention to build an atomic bomb of its own. One certainly cannot rule out the possibility that Osirak might be rebuilt with additional protection against air raids and might be operated perhaps with the less highly-enriched Caramel fuel. But in that case, Iraq, on the whole, could have moved if anything closer to the option for an atomic weapon.

There is an obvious temptation to speculate for what other reasons Israel--which undoubtedly was well aware of these facts all along--might have decided to mount this raid at this time. In view of the obvious failure of other plausible explanations, it thus does not seem so out of the way to assume that Israel--by virtue of the fact that its actions so heavily emphasized the question of an Iraqi nuclear weapon and perhaps even promoted such a development--has come a step closer to the goal of securing recognition for its own ambitions to obtain nuclear weapons as a necessary defense.

FIGURE CAPTIONS

Figure 1. The Osiris Research Reactor at the French nuclear research center at Saclay.

5058
CSO: 8320/1835

BRIEFS

FRENCH PURCHASE OF URANIUM--Niamey, 8 Oct (AFP)--France has bought a further 5,998 kilos (13,195 pounds) of uranium from Niger, according to the Niger official government bulletin. The order brings to 2,253.3 tons the amount of uranium purchased by France from Niger so far this year. [Text] [AB080840 Paris AFP in English 0824 GMT 8 Oct 81]

CSO: 5100/5602

BRIEFS

OPPOSITION TO NEUTRON BOMB--Seychellois and Soviet parliamentarians have expressed great concern over the decision of the United States administration to start full-scale production of the neutron weapon. In a joint communique, published yesterday, following the visit to Seychelles by a four-member delegation of the Supreme Soviet of the USSR, both sides regarded the US decision as another step towards unrestrained arms race and creating further tension in the world. The four-member Supreme Soviet delegation, led by Mr Alexander Juchenko, left Seychelles last night after spending a week-long friendly visit to our country. During a short visit at the Maison du Peuple yesterday afternoon, during which they paid a farewell call on the Secretary General of the Seychelles People's Progressive Front, Mr Guy Sinon, the delegation leader said the visit would serve to develop friendly relations between the two countries. Mr Alexander Juchenko, himself a scientist, commended the efforts made by the Seychelles Government in the field of conserving the natural resources and the development of agriculture. He expressed the hope of extending Soviet cooperation in these fields. [Text] [Victoria NATION in English 19 Sep 81 p 2]

CSO: 5100

EXPERTS CRITICIZE SAFETY OF NUCLEAR REACTORS

Brussels LE SOIR in French 11 Sep 81 p 2

[Article by Guy Duplat: "Nuclear Security in Belgium: Disorganized Control and Criticism by the EEC"]

> [Text] The safety precautions required in the utilization of nuclear energy have always been of concern to the public. The controversy over the dumping of radioactive waste into the sea is presently in the spotlight because of the demonstrations against the loading of those wastes onto two "garbage-boats anchored at Zeebrugge. But energy producers and ecology groups are above all divided over the safety of operations of the nuclear electric generating plants.
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> Along the same lines, questions are being asked about the adequacy of the safety measures at Belgian plants. A report by experts from the European Communities among other things criticizes the procedures under which the new plants Doel 3 and Tihange 2 are being built, as a result of which the plants are already well on the road to completion even though their safety has not yet been fully evaluated.
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> Meanwhile, though the IAEA [International Atomic Energy Agency] contends that 50 full-time experts are needed to monitor Belgium's nuclear plants the company presently responsible for carrying out this monitoring has only 17 people available for the work. The government announced, right after the Three Mile Island accident (in the United States), that monitoring procedures were to be reformed, but more than 2 years later, these improvements have still not been made.

The first problem concerns the permit to build and operate to be given to nuclear plants. The new plants Doel 3 and Tihange 2 are on the road to completion. The nuclear fuel is expected to be brought in toward the middle of next year, but, strangely, these plants have still not received their "construction permit" and no official certification has yet been made as to their safety. Frequently the experts cannot study the proposal until too late, when it has become impossible to modify the plans for the plant. It was this fact which was deplored by the group of

European experts commissioned by the Belgian Government to study the safety of these two new nuclear plants. In their report, which has just been submitted to the Belgian Government, one reads: "The absence of a preliminary safety study results in the plants' being constructed concurrently with the safety studies, so that the experts are aware that their influence over the technical decisions made is close to nil, and because of this they often run up against an accomplished fact. There is nothing more to be done but to accept sometimes questionable compromise solutions. This situation is unhealthy."

The same malaise occurs in the Belgian organization, the Vincotte firm, which is also commissioned to analyze the safety of future power plants.

Vincotte Does Not Control the Power Plants!

To rectify this "unhealthy" situation, the European experts propose a procedure similar to that in the United States. Nuclear power plant builders would have to submit a preliminary safety study even before construction began. That study would prescribe the broad lines to be followed. The experts would approve the proposal, modifying it if need be. A second safety report would be prepared upon completion of construction and would have to show that the power plant conforms with regulations in force and with the broad lines specified in the preliminary report.

Belgium, however, has continued to reject the inflexible and time-consuming American procedures, and has preferred to be content with one safety study submitted just before the plant goes into operation. In addition to this "unhealthy situation" which it does not look like will be changed in the near future, there is a malaise and some confusion in the nuclear safety agencies.

With regard to the malaise, "astonishing" statements from the general manager of Vincotte have stirred up trouble through the nuclear community. Interviewed by BRT [Belgian Radio and Television], Mr Lhonneux in effect stated that Vincotte in reality does not exercise any continuing control over operating nuclear plants. "All control rests in the hands of the officials of the plant itself." The only control, he added, is that exercised by the ministries of employment and labor and by the ministry of public health, "but they do not have the personnel to exercise such control."

These statements, one suspects, pleased neither the power company officials, nor Vincotte's personnel, nor the officials concerned, who all believe they are doing their jobs tolerably well, but they do reflect a certain malaise. Another sign: Vincotte has only 17 people involved in safety analysis and monitoring of operations of the Belgian nuclear plants, though according to the IAEA 50 full-time experts would be needed for Belgium's nuclear plants.

Finally, there is some confusion at present in the reorganization of Belgium's nuclear safety agencies.

From Concern to Strike

Following the accident at Three Mile Island, the Belgium Government decided to make substantial improvements in nuclear safety control, and put this enforcement out of the reach of the influence of private groups and more under the tutelage of the state.

But 2 years later, one very crucial point has still not been decided. Should the entities commissioned to make the safety studies continue to be private firms (the Christian-Socialist position) or should they be replaced by a public regulatory body (the Socialist position)?

The government has not yet decided, but the companies seem prepared to fight for their cause.

At the same time, during the month of August two new nuclear safety agencies were established in the departments of employment and labor and public health. These agencies have a mandate, among other things, to regulate the commissioned entities; in a way they are to regulate the regulators. These new agencies will be funded by a special tax on nuclear kilowatt-hours which has just gone into effect.

Vincotte's nuclear personnel are worried. As the government has still not announced a decision as to their fate, they fear that ultimately they will be cut out of nuclear regulation, in favor of the new regulatory agencies.

We would add, finally, that all of Vincotte's personnel have given notice of intention to strike. To further complicate the problem, social problems are presently troubling the big firm.

But all the same we emphasize that despite all these problems, nuclear safety continues to be maintained with the strictest compliance to Belgian standards and regulations.

9516
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OFFICIAL ON KALKAR FAST BREEDER REACTOR PROJECT

Hamburg DER SPIEGEL in German 7 Sep 81 pp 127-129

[SPIEGEL Interview with Reimut Jochimsen, minister of economics, North Rhine-Westphalia: "Kalkar: 'Museum Piece by 2000?'"]

[Text] SPIEGEL: Mr Minister, construction has been underway on the fast breeder in Kalkar for more than 8 years. It was supposed to cost DM 1.5 billion and start feeding electricity into the system in 1980. In the meantime, the costs are estimated at over DM 5 billion, there are no funds to continue construction and it is impossible to foresee when the reactor will be put into operation. Will the West German breeder on the lower Rhine rot as a nuclear ruin costing billions?

Jochimsen: Things have not yet reached that point. But one thing is clear: the breeder is a child of the 1970 view of the world. This worldview is outmoded. The predictions of the electric industry that unless there were massive expansion of nuclear energy the lights would go out at the end of the 1970's have not been fulfilled.

SPIEGEL: If less electricity is consumed than anticipated and more uranium is available than assumed, should you not then be opting out of breeder technology?

Jochimsen: At least we have more time, and the price relationships of all kinds of energy have undergone a shift. The energy consumer must now get a frank, honest answer from the electricity producers to the effect that getting into the use of nuclear energy will in no way make electricity cheaper, but rather it will be more costly on a long-term basis. In respect to the fast breeder the hour of truth has come thanks also to the gap in financing. Thus, periods of high interest can also have their good side.

SPIEGEL: While the Federal government must strain in order to be able to balance its budget, every day the breeder consumes DM 3 million. How high are the costs going to shoot, like the "Tornado"?

Jochimsen: The state is in fact presently at the limits of its financial capability, but we cannot afford a policy of stop and go. If the precarious opportunities for the future of our economy and our society are the issue, then we cannot simply toss a coin.

SPIEGEL: Does that mean that the breeder will be without significance for energy policy for the next few decades, but be only a prestige project of the German electricity industry?

Jochimsen: I no longer see a sound economic necessity for completing it. We must maintain a completely level-headed approach: breeder technology, as a contribution to overcoming impending uranium shortages, has no broad-based chance of application at all prior to 2000. Thus, I also understand the lack of enthusiasm of the companies which supply electricity to get more strongly involved in financing the breeder.

SPIEGEL: And why should they if the Federal government insisted only on an 8-percent involvement in the development costs on the part of the electric companies, but generously assured them that the nuclear factory will pass into their hands upon completion?

Jochimsen: We must learn from Kalkar. In the future such research and development work can no longer be done using a formula which says that the public carries 92 percent and the industry which is directly interested 8 percent.

SPIEGEL: Minister for Research von Buelow has already announced: more money or stop building. What advice will you give when you meet with the Laender ministers of economics on Monday of this week to discuss how they intend to drum up the missing billions?

Jochimsen: To remain firm. My advice to the electric companies is a good dose of more honesty. They must now clearly state whether they will want breeder technology in the next 20 years. If that is the case, then they must now use a share of the profits for such ambitious things as the breeder.

SPIEGEL: And once again they are supposed to extract the money from the consumer?

Jochimsen: If the tasks of the companies include nonnuclear and nuclear energy research, then this must also be included in the rates and prices.

SPIEGEL: Do you, as the responsible minister of economics, who has to authorize electricity prices, intend to get the money from private electric customers by means of higher rates which is to be spent for energy research?

Jochimsen: Only under one condition: it must affect not only the small consumers and households, industry as a large consumer will also have to contribute.

SPIEGEL: Will not then all electricity consumption contracts with the industry have to be renegotiated because to date there still have been no sliding-price clauses which also take research costs into consideration?

Jochimsen: Indeed. The customer's eyes must be opened. On the one hand by the politicians, that is their moral responsibility; but also on the other hand, by the operators, that is their company responsibility. This is, of course, the dramatic element that nuclear energy is obviously more expensive than has always been assumed, and that this simple calculation no longer applies that energy will become increasingly cheaper. At the moment the French are finding this out in their Super-Phenix....

SPIEGEL: ...a breeder that is four times as big as in Kalkar and which is supposed to start generating electricity starting in 1983....

Jochimsen: In the meantime we have learned that the costs of the Super-Phenix have gotten out of hand for the French, as has Clinch River for the Americans. Electricity is becoming substantially more expensive than with traditional light water reactors.

SPIEGEL: Would it not be better then finally to bid farewell to the fast breeder as a pilot project for directly imminent commercial introduction?

Jochimsen: As far as I am concerned all the political pressure is gone. Construction is underway on a research reactor in Kalkar.

SPIEGEL: But there is already one in Karlsruhe. Thus, isn't the 5 billion for breeder research a huge misinvestment?

Jochimsen: We want to finish building it even if it will possibly belong in a museum in 2000. If that happens it won't be a tragedy either. We will still have gathered technological experiences.

SPIEGEL: Would it not be better then to spend the billions which you have to put into the breeder as learning money for research on alternative energy sources and technologies for saving?

Jochimsen: Now we must do both. We have reached precisely the point where we must now finally draw conclusions from this knowledge. That is: invest a great deal in alternative energy research.

SPIEGEL: But instead of taking that to heart you are building a 300-megawatt high temperature reactor (HTR) in Hamm at a cost of over DM 3 billion which, except for the Land North Rhine-Westphalia, no one wants to have.

Jochimsen: As far as I am concerned the HTR is also an alternative kind of energy. I never tire of praising its advantages: high quality process heat, smaller units, greater safety. With the fast breeder in the event of a disruption action must be taken in seconds, with the light water reactor as in Biblis or Grafenrheinfeld minutes. With a small HTR we have hours.

SPIEGEL: No other industrial country is building the HTR. The people in Bonn and and the energy industry cling more to the breeder. Will there ultimately be a second nuclear ruin in North Rhine-Westphalia?

Jochimsen: I don't think so. We are fighting for the survival of the HTR because we can utilize the high quality process heat which we obtain for coal gasification or liquefaction. After all, here in this district we are right on top of the coal.

SPIEGEL: Doesn't the Ruhr basin have enough environmental pollution already?

Jochimsen: The nuclear energy policy will not become easier if we hide the reactors somewhere in a green meadow. We must take care to be able to use smaller reactors which can be safely controlled by man and which are rather in keeping with the human dimensions.

SPIEGEL: Do you intend to bring the 100-megawatt reactors to the city hall square?

Jochimsen: I would not rule that out.

12124
CSO: 5100/2326

UNSOLVED PROBLEM OF LOW LEVEL RADIOACTIVE WASTE STORAGE

Hamburg DER SPIEGEL in German 14 Sep 81 pp 31-36

[Text] At collecting points in the Laender and in nuclear power plants, atomic waste is piling up--no one knows what to do with it. Will reactors soon have to be shut down?

On the geest ridge along the Elbe River, between acadias and alders, beechtrees and pines, there is also barbed wire which is taller than a man. It guards a windowless concrete building.

There in Geesthacht, 30 km from the Hamburg city hall, 20 km from the FRG-GDR border, behind NATO wire and thick masonry, are stored caesium 137, iridium 192, radium 226 and other radiating material, radioactive waste from hospitals and research laboratories, industrial enterprises and a nuclear reactor.

Contaminated overalls, cannulas and pipettes, remnants of equipment, textiles and furniture which were contaminated are sealed off in yellow air- and watertight barrels with rolling hoops. In Geesthacht the four North German coal states--Bremen, Hamburg, Schlewsig-Holstein and Lower Saxony--are unloading whatever they accumulate in the way of so-called low or medium level radioactive waste and which must not fall into any human's hands.*

In the 7.80-meter high bunker at the Land collecting point the barrels, which hold 200 and 400 liters, are at times piled up 5 deep and the site which had been provided for waste from Lower Saxony has been booked solid for months. Since there is no room elsewhere, at the beginning of the month the Land government set up its own collecting point, in Steyerberg near Nienburg, and experts in Bonn are very concerned: "The Laender no longer know what to do with their nuclear waste."

For that's how it is not only in Geesthacht. Sooner or later the end threatens everywhere in the FRG, at a total of nine Land collecting points which have long since ceased to collect the low and medium level radioactive nuclear waste, but rather--no one knows how long--stockpile it. This is also true in 14 nuclear power plants which themselves are collecting.

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* Radioactive radiation is measured in Curies (Ci). Radioactive waste is considered low level when there is radiation of 1 Ci per cubic meter, medium level up to 2,000 Ci, above that high level.

Annually in the FRG alone 13,000 cubic meters of low level wastes accumulate--more than fits into 2,000 VW delivery vans packed to the hilt. Nuclear equipment and large research centers produce 80 percent of this.

Because "the whole mess is getting out of hand," according to a spokesman from the "German Society for Reprocessing Nuclear Fuels" (DWK), a union of the 12 largest FRG electricity producers, the nuclear industry and the politicians, nationally and in the Laender, are seeking a way out of this dilemma which they have brought on themselves--brought on themselves because all along they have all been thinking more of the use of nuclear energy than of its waste.

The only way out: we must have a final storage facility where the waste, some of which will continue to radiate for several hundred years, is safely secured until it has become no longer dangerous to human and other life.

Quite apart from the unsolved question of what one ultimately plans to do with the highly radioactive waste, in the view of the "German Atomic Forum" it cannot be ruled out that "individual nuclear power plants will have to be shut down" if a final storage facility for these low and medium level radioactive substances is not soon available.

Up to the end of 1978 something like that still seemed unthinkable. Up to then the Laender and the nuclear power plants had packed the seemingly less problematic nuclear waste into barrels and sunk them into the former saltmine Asse near Wolfenbuettel. In all, 125,000 barrels containing 200 liters each of low level radioactive wastes and 1,300 with medium level radioactive wastes were placed in storage in Asse, presumably as an experiment, but actually no doubt as final storage. Then the questionable activity was stopped because it was not permissible according to the nuclear law: a regular licensing procedure, with determination of the plan, faultless demonstration of safety and participation by citizens, had never taken place.

With the no-longer-manageable nuclear waste mountain in mind, Prof Hans Wolfgang Levi, scientific-technical business manager of the Munich "Society for Radiation and Environmental Research" which is responsible for Asse, demanded on Thursday of last week the opening of Asse for final storage "with the greatest possible speed."

One day later, Friday, Bonn and Lower Saxony ministers discussed how that could be wangled. At an emergency meeting in Bonn, coalition colleagues Andreas von Buelow (research) and Gerhart Baum (interior) and Hannover CDU ministers Birgit Breuel (economics) and Herman Schnipkoweit (social affairs) quickly agreed with winking of the eyes that--independently of a licensing procedure that will take years--the "research and development studies in Asse" must be started up again immediately, obviously even now to be able to start final storage.

Such muddling and intriguing is characteristic of the deplorable state of affairs in waste removal everywhere. That which at first appears to be a problem of quantities in the case of low level radioactive waste is a thousand times greater safety problem with high level waste--and all the more unresolved.

Here not only the 14 nuclear power plants produce what the reactor holds, but in an unconcerned manner there is additional building and further planning is going on. But even now the legally prescribed proof of waste removal resembles a switch in the future, and it is unclear how that is to be met.

In La Hague in France where the spent fuel rods from German nuclear power plants are supposed to be reprocessed, there is something wrong with the technology. For the present they have stopped accepting more, the contracts expire in 1985. And at some time or other the highly active waste, which is sent to France for treating, must be taken back by the FRG anyway.

A reprocessing factory in Wethen (North Hesse) planned by the DWK cannot be built there after it turned out at the end of August that the ground is not suitable. According to its own statements, the DWK will not be able to name a new site until "toward the end of the year." Previously the plan was halted to prepare a national waste removal center on a gigantic scale with reprocessing work at the surface and final storage down below in the salt dome in Gorleben, Lower Saxony.

The emergency solution to store the spent fuel elements, tightly packed, first in the nuclear power plant for years, is possibly now also out of the question: such compact storage, already authorized or planned for numerous nuclear reactors, is in violation of the nuclear law according to the findings at the beginning of this month by a chamber of the Darmstadt Administrative Court in connection with the Biblis nuclear power plant.

The medium-term solution to build intermediate storage facilities for the spent fuel elements in Ahaus and Gorleben in North Rhine-Westphalia is likewise not progressing. North Rhine-Westphalia government head Johannes Rau decided that Ahaus will not be approved until the relocation of the fuel elements in a final storage facility has been guaranteed. For the present Gorleben is delayed because the licensing procedure must be checked in view of blatant deficiencies.

Finally: at the earliest, it will be 10 years before it is known whether the Gorleben salt dome, in which the highly active waste is to be buried until the end of time, is even suitable for it.

Even if by then it has turned out that safe final storage is possible there (which is doubted by critical scientists)--it remains to be seen whether is is even economically reasonable and politically implementable.

For the West German antinuclear movement, which is drawing heavily from Bonn's government parties and is very much in evidence, for example, at the Borkdorf, Gorleben and Grohnde nuclear sites, wants to prevent construction of new nuclear plants, by hook or by crook.

So the legal route is being taken, and there are demonstrations wherever this is a reason--soon every week somewhere in the country. And if the opposite side, as is happening in the matter of compact storage, has to suffer a rebuff, then according to the Berlin TAGESZEITUNG the antinuclear scene will "finally once again have reason for piggish schadenfreude."

There is even discussion of "bringing the topic of nuclear waste to the public and dramatizing it throughout the country by means of spectacular activity." The "scenario" of such a campaign, which is to lead to "take-overs of railroad stations and blockades of tracks" provides, among other things, for the following:

"Thronging crowds" means: become more familiar with the politicians; inundate train information ("Please tell me when the next nuclear waste express will arrive."), "spontaneous" demonstrations in trains and railroad stations and on the streets; simulated protective exercises for catastrophes: for example, an order to leave the railroad station is given, the station is sealed off for a short while because a nuclear waste transport is passing through. Trains are cancelled because a nuclear accident has taken place along the route. New schedules which are supplemented by the nuclear waste transports.... At a specific time within a uniform national period of time a shutdown of FRG train traffic.

The transport of waste is in fact a dangerous weak point in dealing with radioactive material--no matter whether it comes from a nuclear power plant or from the clinic around the corner. Every year thousands of transports by rail and road provide countless attack points and risks of accidents.

Anyone who must handle such material must, according to the nuclear law, see to it "that radioactive residues, which accumulate, as well as radioactive plant parts which are expanded or dismantled...are rendered harmless or are disposed of in an orderly manner." For this purpose the Laender must establish "Land collecting points for intermediate storage," the Federal government has to take care of final storage. For the present the Land collecting points are only available for low and medium level radioactive wastes.

Sometimes the producers themselves cart their radiating waste to storage, sometimes a pickup service is organized. Occasionally the waste is duly packed, then again it is brought loose, sometimes it is presorted according to kind and dangerousness, sometimes just divided into liquid and solid substances. Dead animals or "other kinds of substances which can cause putrefaction and fermentation must be preserved by deep freezing" and can be brought in a freezer.

Many a collecting point, such as the one in Ellweiler in the Rhine Palatinate, is used by no less than 400 customers. In the North Rhine-Westphalia storage facility within the Juelich nuclear research plant annually about 1,500 barrels accumulate from the Land, in addition 10,000 barrels pile up from the plant itself. Much of the material in the barrels, with "half-life periods" under 60 days will quit radiating after approximately 2 years, other material with half-live values of 30 years will not stop for centuries.

Collecting points are located in Westwall near Schwalbach-Elm in the Saarland or in Steyerberg near Nienburg, Lower Saxony, just 600 meters from the Bundeswehr's ammunition dumps. What arrives there is in part deposited unchanged, in part compressed, incinerated or concentrated in order to reduce the volume.

Storage in the nuclear power plants is equally explosive; they must needs provide on the spot intermediate storage for the largest part of their waste. And all are waiting for Asse.

Radiation researcher Levi says "the low and medium level wastes are" in view of their large volume "less suited for storage above ground." Thus, there is now an investigation underway whether, in addition to Asse, perhaps even the former ore mine "Konrad" in Salzgitter is suited to be a final storage facility.

But even if suitability is demonstrated, in this instance a lengthy licensing procedure would likewise be required--so that even "Konrad" for the present will not be of further help.

Other countries are not at all so fussy in this. Switzerland and Holland, Great Britain and Belgium, for example, have simply dumped their wastes for years into the Atlantic. Just last week there was again a riot in the Belgian port of Zeebrugge when environmentalists tried to stop the loading of 5,000 tons of nuclear waste which a freighter was to transport to the Bay of Biscay.

The German nuclear power lobby would like best to have things that simple, too. The "German Atomic Forum" demanded that legal conditions for sinking low level radioactive wastes into the deep sea should be created nationally.

12124
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NUCLEAR WASTE MANAGEMENT ACTIVITIES DESCRIBED

FRG Nuclear Waste Management Concept

Duesseldorf ATOMWIRTSCHAFT ATOMTECHNIK in German Jul 81 pp 421-424

[Article by G. H. Scheuten: "Status of Waste Disposal Concept Implementation in FRG"]

> [Text] If all obstacles to the currently valid waste disposal concept are eliminated by the federal government and the state governments, then--after deducting the quantity of spent fuel elements delivered abroad for reprocessing--German power plants in the year 2000 will still have a stockpile of about 10,000 t BE [fuel elements] to which we will then add about 1,000 t each year. Science, technology, and industry in the FRG are ready and able to build the necessary plants for nuclear waste removal from nuclear power plants and thus to solve the waste disposal problems. The obstacles are primarily of a political nature. Removing them as fast as possible seems to be more urgent than ever before in view of the foreign-policy and domestic-policy data and the incipient developments.

How To Get into a Bottleneck

The point of departure for all our considerations, when we talk about waste disposal, naturally is the need of German nuclear power plants for waste removal; this need is determined by the quantity of developing spent fuel elements from the German nuclear power plants. That can be estimated in advance on the basis of the maximum and minimum variants as a function of the installed nuclear power plant capacity. From such scenarios we can prove that, by the year 2000, we will have about 9,500 or 15,000 t of uranium in the form of spent fuel elements. That is the waste disposal requirement which will result in view of the installed power plant capacity and the nuclear power plants under construction which should start operations by the year 2000--a fact with which we must start our considerations. The likely case, which will materialize in the context of this spread, would seem to be the case where in the year 2000 we would have about 14,000 t of uranium in the nuclear power plants themselves and in outside storage dumps, apart from the quantity which might be processed in the meantime on the basis of contracts with France and Great Britain (COGEMA [General Nuclear Materials Company] contracts, BNFL contracts) and possibly in a second German reprocessing plant. If we visualize this required quantity for the year 2000, then, in all likelihood, we will have a quantity of 10,000 t stored by the year 2000 and during every following year thereafter, starting with 2001, we will be adding an additional quantity of about 1,100 t of uranium per year in the form of spent fuel elements.

In view of this waste disposal requirement situation, certain political slogans have cropped up, for example, the statement: without nuclear power plants, we are in the situation of an airborne aircraft which does not have a place to land or: the key policy-makers and the public likewise were not adequately informed by science and technology when we got into the nuclear energy field--inadequately informed especially regarding the consequences deriving from the operation of nuclear power plants. In this connection there is talk, in two respects, of a "failure" on the part of science and industry and this is tied in with the assertion that this "obligation to provide information" was not met. Because that is the situation in the policy area, we may use this article, for the sake of historical accuracy, also in order to remind everybody what the situation really was like.

When we got the opportunity in 1955 to go into the peaceful uses of nuclear energy, we first of all naturally only had a small program. We first of all erected the demonstration power plants. Then (at the end of the sixties) we began the stepped-up development of nuclear power plants via Stade, Wuergassen, Biblis A, etc. Everybody, the industrial nations of the Western world and the FRG likewise realized clearly how waste was supposed to be removed from power plants although the concept of "waste disposal" was not at all known at that time. It was clear that the fuel elements from nuclear power plants would have to be processed in reprocessing plants, that the recovered uranium and the newly obtained plutonium would have to be returned into the fuel cycle, and that the developing radioactive waste would have to be stored safely for centuries. Back in 1957, a study was prepared in the United States which produced the results that the best and safest storage for radioactive wastes of all kinds would be in the depth of a salt dome because in that way one could rule out the possibility of reentry of these radioactive materials into the biosphere. During the middle of the seventies, we participated in the Eurochemic Plant, in the reprocessing plant in Mol, Belgium, with an annual capacity of 90 t; we founded the Nuclear Fuels Reprocessing Company in Karlsruhe and KEWA [Nuclear Fuel Reprocessing Plant] (both of which were founded by the German chemical industry); we planned the WAK (Reprocessing Plant) in Karlsruhe whose construction was begun in 1967. WAK began its operations successfully in 1971.

This historical review is designed to underscore the fact that all those involved (science, industry, and the government) even then, at the end of the fifties, knew what had to be done with spent fuel elements. Since the middle of the sixties, government research institutes have been working on the questions of the final storage of radioactive waste. The GSF as well as the Institute for Deep Storage, Incorporated--both federal government companies--are working on these problems; the closed salt mine at Asse was purchased and experimental final storage was started and successfully carried out until a short time ago. We cannot understand how, in view of this situation, government sources can say that the responsible policy-makers were not adequately and not in time informed regarding the consequences arising from the operation of nuclear power plants. The federal research minister was our constant conversation partner on all of those questions. The federal research minister--specifically the particular federal research ministers from all parties at the particular time--discussed the research and development programs together with science and industry, they translated them into political reality through the debates in the Lower House, in the research committee of the Lower House, and in the finance committee of the Lower House. One can only say that the history of the peaceful uses of nuclear energy in the FRG and the research and development work here clearly proves that every policy-maker responsible at the particular time and concerned with the matter was fully informed on the question: "What happens to the fuel elements after their use in the nuclear power plant?"--and that there was no information shortage. There was therefore never any "failure to inform" and nobody can credibly assert that industry and science did not provide the political establishment with the necessary information.

In 1971, with the support and approval of the federal government, the United Reprocessors Organization was founded together with the BNFL and the French AEC. In the situation at that time, there was fear of a surplus capacity of reprocessing plants worldwide and consequently the Eurochemic Plant was closed down although it had worked successfully until the very last day. This is why, in the context of the United Reprocessors contract, an international agreement was worked out to the effect that the French, first of all, and then the English and then, finally, the Germans would build reprocessing plants within their boundaries in order to avoid a surplus capacity of waste disposal plants. This is an idea which almost sounds fantastic today: the sudden change came in 1973, when, for technical and economic reasons, the civilian plants in the United States were closed down and when the Windscale Plant in Great Britain also had to be closed down for the time being.

This closing of American and British plants resulted in the shortage situation and the realization that the capacity for nuclear power plant waste disposal was inadequate. That was the moment when domestic politics for the first time tackled the problem of German nuclear power plant waste disposal. The waste disposal problem complex was politicized in 1974 and the discussions began also in connection with the beginning acceptance crisis and the controversy over the practicality, correctness, and justifiability of the peaceful uses of nuclear energy. The government--and this must be made absolutely clear--[illegible] the concept of the "integrated waste disposal center." We--industry--agreed to that concept; we considered it to be correct but it was developed by the government, that is to say, by the Federal Research Ministry, and it was presented to the public for the first time at the 1974 reactor conference by a high-ranking official from the Federal Research Ministry. This concept of the "integrated waste disposal center," which we then tried to implement in Gorleben, was a government concept and when it failed, industry was charged with gigantomania. Quite generally it can be said that, in the field of nuclear power plant waste disposal, we have the kind of economic management by government, such as it is to be observed in no other industry branch in the FRG. Because of the politization of the waste disposal problem, the government always says what industry is supposed to do; through laws and amendments, administrative measures, and waste disposal principles, industry is forced to do exactly that which the government wants. Some of the difficulties in the implementation of that which is reasonable and correct however are due to the fact that waste disposal has become so politicized and that massive government interference in the economy is thus being pursued in this fashion. That, in view of this state of affairs, the chemical industry has "gotten out of the "reprocessing field--the way many people put it--constitutes a completely understandable reaction from an economy branch which wants to stay away from such things; and basically one can only congratulate the chemical industry operators for having had the courage at that time to get out of that business.

Waste Disposal Center--Waste Disposal Concept

The causal source agent principle has produced a situation in which the electrical power industry had to address itself to the waste disposal problem complex and, in keeping with government specifications, first of all made an attempt to implement the "integrated waste disposal center." "Constructive compulsion"--that was the official lingo used at the time--was exerted upon industry in order to make sure that this would be properly done. The requirements called for a capacity of 1,400 t, collection (assembly in terms of space), plus the interrelated time factors; and the government, in a different form, that is to say, in the form of the State of Lower Saxony, then also specified Gorleben as the site which had not been picked by the designated industrial establishment and which first of all caused the concept of the "integrated disposal center" to fail.

On 16 May 1979, the following was declared during a special session on the peaceful uses of nuclear energy in the FRG: the "integrated waste disposal center" is technically feasible and can be put together in safety-engineering terms--but it cannot be pushed through politically. That put us back on square one and we have lost DM 140 million. In view of this situation, the heads of government on the federal and state levels developed a new concept which, in semantic similarity to earlier concepts, is now no longer called "integrated waste disposal center" but rather "integrated waste disposal concept."

This "integrated waste disposal concept" brought us the grand German waste disposal solution, that is to say, intermediate storage of spent fuel elements, and we ourselves contributed to that by developing a new storage concept, that is, the storage of spent fuel elements in transport containers. This form of storage, which today looks very reasonable and correct to us, and will perhaps also be used in those countries where delays develop and where German-style safety regulations apply.

In addition to this medium-range storage--the heads of government as we know decided --a reprocessing plant is now to be erected as soon as possible in the FRG. The idea here is basically to prevent a situation where reprocessing technology is lost in the FRG. That would unavoidably be the consequence if we were not to be able consistently to work on the planning and construction of a reprocessing plant. We cannot expect our engineers to devote themselves to a technical task of which they do not know what kind of future it has. We must continue with the planning and construction of such a plant; otherwise, the technology, the knowhow will be lost in the FRG as a result of personnel losses, due to the departure of personnel, especially the very best personnel.

We are happy that all responsible political forces, the heads of government on the federal and state levels, the Lower House inquiry commission, and also the German Federation of Labor recognize this viewpoint and that everybody therefore considers the erection of a reprocessing plant as being necessary and correct--as soon as possible. In addition to this planning for the reprocessing plant, we are also looking into other waste disposal techniques which we will report on later. So much for the content of the decision by the head of government.

After that, the basic decision as to what route we are finally going to take regarding the waste disposal from nuclear power plants in the FRG, should then be made during the middle of the eighties. In keeping with this decision by the heads of government, the waste disposal principles--which had been drawn up for the nuclear power plant licensing procedure--were then adjusted and are today decisive when it comes to the licensing practice of licensing authorities under atomic law.

The resolution of the heads of government of 28 September 1979, which we briefly reviewed above, leaves the option open for reprocessing or for final storage of spent fuel elements. We seem to be living in the age of options, to begin with! The inquiry commission leaves the option for the fast breeder open at least up to the year 1990; the decision for or against is to be made only then. It would seem that the time has come to observe that it is not an essential characteristic of democracy to open up the large number of options and not to make any decisions; instead, the essential feature of a democracy is that necessary decisions are made according to rules of the game spelled out in the constitution and that the minorities then abide by those decisions.

Basic Features of Waste Disposal Planning

After this little excursion into politics we might return to the state of the art in waste disposal today. Around 2,300 t of spent fuel elements--which will develope mostly until 1985--go into the French reprocessing plant of COGEMA at Cap de la Hague, specifically, on the basis of the reprocessing contracts signed with France. A portion also goes to the BNFL (British Nuclear Fuels Limited) in Windscale. As for the rest, the fuel elements are placed in intermediate storage in compact dumps of nuclear power plants, to the extent that permission has already been given for that; additional licensing procedures have been started for two outside intermediate storage facilities with a capacity of 1,500 t, each. We might expect to get the construction permit for at least one of those intermediate storage facilities during the course of 1981. These are the intermediate storage facilities at the Gorleben and Ahaus sites; the licensing procedures run parallel and we must wait to see which licensing authority will be the first to give us the permit for the erection of such a plant. If the licenses are issued according to expectations, then we would have accomplished the task given to us, that is, at the latest by the year 1982, to make available an adequate intermediate storage facility for spent fuel elements located outside the nuclear power plant. The two intermediate storage facilities at Gorleben and Ahaus are to be so constructed that the fuel elements will be stored in transport containers with every transport container having to meet the safety requirements established by the licensing authority.

The reprocessing plant, which has been planned in the State of Hesse with a capacity of 350 t/yr, could make a further modest contribution to waste disposal from German nuclear power plants; a license application has already been filed for that plant. If the plant goes into operation in 1992-1993, then it could process about 2,300 t by the year 2000 so that the total storage inventory, related to the year 2000, would be about 10,000 t. At this point we want to thank the Hesse state government for the initiatives launched there and for giving us a possibility to start a new licensing procedure, even though that only covers a smaller reprocessing plant. The process is now underway. But even if the small plant in Hesse is placed in operation, there will still be 10,000 t of uranium in spent fuel elements in the dumps by the year 2000 and about 1,100 t will be added each year thereafter. This means that the heads of government must stick to the decision of 28 December 1979; at the very latest by the middle of the decade, a decision must be made as to how the whole thing is to be continued. Whether the political decisions will then come out in favor of reprocessing or in favor of final storage is something I do not want to get into at this point; but the decision as to the final solution must be made then. We keep hoping for reprocesing because overwhelmingly objective arguments speak in favor of it. Regardless of that, we also consider it correct and meaningful to develop the alternate waste disposal technique, that is, the "discarding" of fuel elements. We should master this technique because, from the viewpoint of a reprocessor likewise, it may be entirely meaningful in the individual case to forget about the reprocessing of a certain fuel element and to "throw it away" after corresponding treatment.

As we said before, in addition to our planning, the Federal Research Ministry has launched a development program concerning "alternate waste disposal techniques." Industry is cooperating in this project and we hope that we can in this create the basis for enabling the political establishment to make the necessary decision as to further waste disposal activities at the latest by the middle of the decade. We hope that this will not mean again that we are only goint to get options. Because we in the FRG have to live with those options, it is perhaps a good idea to say a few words on the multioptional situations. (The situation after all is not only dioptional, trioptional, but rather multioptional.)

The decision in the middle of this decade in favor of reprocessing upholds the option picked by the inquiry commission to the effect that we might later on decide in favor of the fast breeder. Dropping the idea of reprocessing--today or in several years--by the way also signifies dropping the idea of the fast breeder. It is not true--as one often hears in public--that the construction of a reprocessing plant is a prior decision in favor of the fast breeder. The construction of a reprocessing plant merely upholds the option for a fast breeder--nothing more! By the way, we must also keep in mind that reprocessing today is the only available technology with which nuclear power plants can be relieved of their waste in a responsible manner in terms of safety engineering. The other options--the alternate waste disposal techniques, the "throwaway techniques," the "final storage technique for spent fuel elements," or also the so-called "recoverable final storage method"--are waste disposal possibilities which do not correspond to the current state of our science and technology. Because we have no waste disposal technique available other than reprocessing, we cannot, at this point in time, do without reprocessing. This fortunately is not the intention anyway; in the political area everything points to the fact that the need for the construction of an--albeit small--reprocessing plant has been and is being generally recognized by the responsible policy makers.

Reprocessing also makes sense if a political decision should be made against the fast breeder in 1990. We would process the spent fuel elements, we would recycle the plutonium and the recovered uranium, so long and as far as that is possible. In this way we would return the valuable nuclear fuel into the fuel cycle and we would be doing something reasonable and logical in terms of economical resources management.

In this connection we may point out that the FRG and Japan are considered to be leaders worldwide regarding thermal recycling (in other words, the return of process materials into LWR). This is a result also worked out by the INFCE (International Conference on Fuel Cycle Evaluation). We in the FRG so far have made more than 15,000 uranium-plutonium fuel rods which have been used successfully in six German and three foreign nuclear power plants in Europe and America.

If we were to forego reprocessing and recycling, we would also fall behind internationally in this field, compared to other industrial nations, for example, Japan.

Direct final storage as a conceivable waste disposal solution can, as we said before, look meaningful in the individual case also to a reprocessor. The route which involves basically throwing away all fuel elements and foregoing reprocessing however would basically be very unreasonable--both in terms of safety engineering and in economic terms. The question also is whether a population, which basically after all is extremely interested in having the work done in an environmentally safe and resources-saving fashion, can stand by and do nothing when the fuels, contained in the spent fuel elements, can be reused to the extent of about 95 percent, are simply thrown away. Some day the population will realize what goes on here and what the background is. With the passage of time, the majority of our population will realize that the ecologically and economically reasonable route, which can be justified in safety-engineering terms, is the correct one and will not approve a throwaway technique which is being pilloried and condemned in the entire remaining industrial production area.

We need not go into any greater deail here regarding the big energy-industry advantages of reprocessing because the advantages are obvious and everybody can obtain more information in the adequate available technical literature. On the other hand, we want to say a word on the concept of the German Federation of Labor which among other things is aimed at recoverable final storage (A. Pfeiffer, "Social and Technical Aspects of Waste Disposal," p 431, this issue). The slogan of "recoverable final storage" is perhaps somewhat unfortunate because it contains a contradiction. After all it means storage of spent fuel elements which on the one hand can be considered as and be treated as final storage but which on the other hand after all is to be such that these fuel elements can be recovered from their storage facility in keeping with subsequent decisions--also involving decisions made by later generations--in order possibly after all to make use of them or to treat them and store them in some other way. In other words, this is the kind of storage of fuel elements which under all circumstances is supposed to be again accessible and recoverable. In this connection, the German Federation of Labor should once again think whether this is really a feasible and justifiable route.

Experts after all so far start with the idea that final storage of spent fuel elements can take place only in such a way that the biosphere will be reliably screened against fuel elements in final storage and that nobody will be able to get at the fuel elements any more. Final storage of fuel elements after all--also regarding saving radioactivity--means that a plutonium mine is being left for later generations; that applies especially when the fuel elements are to be stored in a recoverable manner. This "recoverable final storage" in safety-engineering terms but also from proliferation viewpoints, which after all do play a big role in the community of nations, does not represent a route for which one can take responsibility.

We cannot assume the responsibility for storing fuel elements in such a recoverable form because we would then be introducing dynamite, as it were, and sources of conflict for the generations coming after us and for the community of nations that will exist then. We do not want that and we must not want it. We must so handle out waste materials (when fuel elements must be thrown away, they are waste materials) that the following generations will be touched by this as little as possible. Under no circumstances must we create conflict situations and safety problems for the following generations through out actions today. This is why, in case the political establishments should decide in favor of final storage, we are in favor of the kind of final storage of fuel elements which will make it impossible for anybody to get at them, according to our present-day knowledge and ability. It therefore seems that one cannot assume the responsibility for recoverability.

In conclusion I would like to say a word on the situation regarding the planned reprocessing facility in Hesse. The search for sites, which we have been engaging in there for many months, is not yet over. In January of this year, we received the so-called specific nuclear site criteria from the Federal Interior Ministry, which we must comply with as a search pattern for the site location. On 25 February 1981 we received the site criteria of the State of Hesse space arrangement and state planning. We are currently trying to figure out whether and to what extent the Hessian makes it possible for us to consider the preselected sites as suitable. We are getting ready within a few weeks to present the result of our site study to the Hessian state government in order then to discuss and coordinate further action on the site issue with the state government.

The Hessian community elections led to a rather noteworthy political landslide in a community which in public was frequently mentioned as a suitable location. Optimistically one might say--and as operator one is inclined toward optimism--nuclear energy was able to win a 59-percent victory here in this election because all those who are against reprocessing in this well-known city through the vote by the Free Association of Voters or the voter list, came out against a reprocessing plant; but that only accounts for 41 percent. All voters, who voted for the "established parties"-- as theyput it so nicely today--and that makes 59 percent did come out in favor of the plan. I said that one might argue in this fashion rather optimistically. But we must wait and see how things develop. This community is not the only site which plays a role in our consideration. There are several such sites--fortunately!

It also remains to be seen what the Hessian state government has to say to that. It is to be hoped that we will soon have a result and that, perhaps in 1984-1985, we will then also get a construction permit for the reprocessing plant which we have planned.

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Other Waste Management Techniques Described

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[Article by H. Boehm and K. D. Closs: "Direct Final Storage--Development Level and Problems Connected with Other Waste Disposal Techniques"]

> [Text] In 1970, the BMFT [Federal Ministry of Research and Technology] directed the Karlsruhe Nuclear Research Center to conduct a study involving an initial comparison of the various waste disposal alternatives. In particular, the study was to investigate the possibilities and risks connected with and without reprocessing of spent fuel elements or with conditioning and final storage of radioactive waste coming from reprocessing or, on the other hand, the packaging of entire fuel elements and their final storage. Here among other things we must consider the waste volumes which result alternately from direct final storage or in connection with the integrated waste disposal concept, as well as the criticality safety, the radiotoxicity, and the proliferation safety. In addition to the technical and safety-engineering aspects, energy-policy questions play an important role here.

1. Introduction

Ever since work has been done in the FRG in the field of nuclear waste disposal--and this has been the case for more than 20 years--there have never been any doubts that nuclear power plant waste disposal will involve reprocessing of spent fuel elements. This view was once again emphatically confirmed by the federal government in 1974. Activities in recent years were also aimed at the implementation of this concept. Without deviating from this goal however it was decided in 1979 on the policy-making level that, in addition to this, other waste disposal techniques would be investigated, that is, especially, direct final storage of fuel elements.

The decision by the heads of government in September 1979 as we know provides for the following: in addition to work on the implementation of the integrated waste disposal concept, it would also be necessary to study other waste disposal techniques in terms of their practical feasibility and their safety-engineering aspects; this would have to be done so quickly that a final judgment, as to whether decisive safety-engineering advantages might result, would be possible during the middle of the eighties. The inquiry commission made a similar statement, but with a longer-range time frame.

In addition to the United States, Canada, and Sweden, the FRG thus is the fourth country which is investigating direct final storage of spent fuel elements as waste disposal possibility, whereby, among the countries mentioned, it is the only one that does not have any major uranium deposits. The decision to investigate this waste disposal variant was politically justified in the United States and Sweden just as much as in the FRG and is not a result of technical or economic developments.

The reason in the countries mentioned however differs from one country to the next. In the United States--under President Carter--an attempt was made to reduce the proliferation risk by foregoing any commercial reprocessing and by trying to get the other countries to follow that example. The results of the INFCE however led to a definite relaxation of tension on that score. It remains to be seen which "waste disposal policy" the United States will pursue in the future.

Sweden on the other hand had entirely different reasons for the investigation of direct final storage of fuel elements. Because Sweden--on account of its relatively small nuclear energy program--is not planning to put up a reprocessing plant of its own, but rather depends on reprocessing in foreign plants, the so-called Stipulation Act for the commissioning of new reactors calls for the evidencing of either a safe final storage facility for highly radioactive reprocessing waste in combination with a reprocessing contract or evidence as to safe final storage of spent fuel elements.

In Canada, direct final storage of fuel elements was considered a possibility although no decision was made; this is due to the fact that Canada has very large uranium deposits and that there is therefore no need for any fuel recycling in the near future, apart from the fact that the reprocessing of fuel elements from the CANDU reactors is less effective.

If we ask for the reasons behind the decision of the FRG government, then we can clearly see that the aspects mentioned for the United States, Canada, and Sweden did not influence the decision. As we can tell from the decision of the heads of government, there is no doubt that reprocessing and return are feasible in terms of safety-engineering and that nuclear power plant waste disposal can be guaranteed from ecological and economic viewpoints. Instead, the reason is to be found in the political problems connected with nuclear technology in general and the implementation of the integrated waste disposal concept at this point in time, in particular, as well as the fear of some circles that the decisions in favor of reprocessing might at the same time signify an irreversible decision in favor of the phase the inquiry commission referred to as "nuclear energy II."

The resolution of the heads of government to investigate both waste disposal possibilities, pending a final decision, thus mitigates the momentary domestic-policy problems in that it keeps open the option both for a long-term renunciation of nuclear energy and for its stepped-up expansion.

We mention this in order to make it clear that the emphasis here is on political problems which cannot be solved only through an undoubtedly meaningful comparison of technical and ecological aspects of both waste disposal variants. Regardless of that we come to the important question as to the extent to which one can meaningfully compare the waste disposal alternatives and the steps involved in them, individually, or whether the comparison would not in each case have to cover the entire corresponding fuel cycle in order to arrive at a reasonable evaluation.

For example, a comparison of the various aspects of a reprocessing plant with those of a conditioning plant for spent fuel elements does not take into consideration the considerable differences in final storage. But an evaluation of both complete waste disposal concepts can also lead to the wrong conclusions if one fails to consider the consequences deriving from the waste disposal concepts regarding uranium procurement--and the attendant safety-engineering aspects, including, for example, the waste from the uranium mining. If we consistently compare the particular complete fuel cycles, then we come to the question as to how the fact--that individual steps in the cycle (for example, uranium mining) take place in other countries and that any related negative consequences appear only there--is to be evaluated in connection with a national decision.

This hint is designed to show that it is of great importance to us what parts are included in an evaluating comparison. If we try to make such a comparison on the basis of a judgment, then this is possible only on the basis of evaluation criteria and their weighting which has first been agreed upon. Here we come to another problem because we know that, in weighting of criteria, such as feasibility, technical safety, environmental pollution, reliable supply flow, economy, social acceptance, etc., there are considerable differences between nuclear energy foes and advocates. The really difficult task of the decision-makers will be to weight these criteria. In the weight of the above-mentioned political events, the BMT in the summer of 1979 directed the Karlsruhe nuclear research center to conduct a study which was to provide an initial comparison of the various waste disposal alternatives. This article is essentially based on this study (1) which at the same time is also supposed to show in what areas greater efforts are necessary in order to facilitate the anticipated final evaluation.

2. Concepts and Projects in Other Countires

In contrast to the integrated waste disposal concept, there is no standard procedure, for the direct final storage of spent fuel elements, regarding the conditioning of these elements for proper final storage. One might conceive of several variants, as shown in Table 1, none of which however has been adequately tested; here we only want to take a closer look at the first two alternatives mentioned. The simplest method consists in packaging entire fuel elements, a method which is being used in the United States and Canada. Here the fuel element is inserted into a container which is then welded in a gas-proof manner. If necessary, the empty spaces between the fuel rods are filled with a liquid metal. Whether this is necessary will depend above all on the mechanical stress in the final storage facility and the strength of the container material used.

Table 1. Possible Conditioning Methods for Spent Fuel Elements

Increasing number of process steps	Packaging of entire fuel elements
	Packaging of individual rods
	Packaging of fuel rods after evacuation of fission gases
	Packaging of cut fuel elements
	Transfer of fuel into glass or ceramics products

Another conditioning method, which was investigated especially in Sweden, starts with the idea of not packaging the whole fuel element but only the indivdual fuel rods for proper final storage. After the removal of the head and base features of the fuel elements, the fuel rods are drawn and inserted into the final storage container. The advantage here is that one can increase the packaging density of the fuel rods in the final storage container roughly by a factor of two-three and that one can reduce the number of corresponding final storage containers to the same degree. By drawing the fuel rods and through the separate treatment of the separated structural parts however we get secondary waste so that a part of the advantage is canceled out again. In drawing the fuel rods there is the danger that the fuel rods might be damaged and volatile fission products might be released into the conditioning plants; this is why greater requirements must be established for the waste gas system in this conditioning method.

The third conditioning method mentioned in Table 1 differs from the previous one only by virtue of the fact that the fuel rods are drilled and that the fission gases in the fission gas plenum are drawn off. This extensively rules out the possibility that volatile radionuclides might escape into the sealed area of the final storage mine, in the final storage area, from defective fuel rods when the final storage containers are simultaneously defective. Of course, this method calls for comprehensive waste gas purification and separate treatment of the retained fission gases.

Another possibility for the conditioning of spent fuel elements consists in cutting the fuel rods up into short pieces and then embedding them in a metal matrix. A part of this conditioning method here corresponds to the mechanical "head-end" of reprocessing. In the method mentioned last in Table 1 which however is hardly getting any serious consideration--that is, the conversion of the fuel into a stable glass or ceramics product--there would be a process which would already be very close in some of the component steps to the reprocessing method because here, in addition to the mechanical comminution, we have dissolution of the fuel in nitric acid with subsequent vitrification or conversion into a ceramics product. In summary we can say regarding Table 1 that the condition possibilities mentioned here, in sequence from top to bottom, are characterized by an increasing number of process steps and a rising development of secondary waste.

Concerning final storage of fuel elements, the concepts which so far are available worldwide reveal the following common features:

Final storage is carried out only in one storage level;

The conditioned fuel elements are stored in drill holes which are drilled perpendicularly down from the galleries of the final storage mines;

Only one fuel element container is stored in each drill hole.

Of course, other techniques might also be conceivable.

As we said before, until 1979, three countries looked into concepts for the conditioning and final storage of spent fuel elements, that is, the United States, Canada, and Sweden. While Canada and the United States have already started experimental work on the conditioning of fuel elements on an industrial scale, Sweden for the time being confined itself primarily to comprehensive studies, without any parallel major experimental programs so far.

Because granite is intended as final storage medium in Swedium--where one can always expect a certain water penetration--special requirements were set up for the packaging of the final storage products. For spent fuel elements, the final storage container consists of copper with a wall thickness of 200 mm. The interval between the individual fuel rods is to be filled with lead. This container is expected to have a lifetime of at least 10^5 years terminal storage conditions. Special reference must here be made to the heavy weight of the terminal storage container. For the final storage of fuel elements, plans call for the insertion of compacted bentonite rings and discs in the area of the drill holes; these rings and discs swell up considerably as they absorb water so that the cracks and gaps in the area of the drill holes will be closed and will make it difficult for any additional water to get into the waste. Bentonite is a special type of clay with low permeability and a good retention capability for radionuclides.

A group of international experts in November 1979 certified the basic technical feasibility of this concept but at the same time indicated that it considered this concept to be too excessive. One point of criticism involves the high copper and lead consumption. With a nuclear power plant capacity of 50 GTU and an operating time of the terminal storage of 50 years, there would be about 250,000 t of lead and 1,000,000 t of copper in the terminal storage; that roughly corresponds to the annual consumption of those metals in the FRG. Even though these quantities do not constitute any decisive obstacles, either in terms of current availability or in terms of cost, one must nevertheless keep in mind that such a terminal storage facility would represent a "lead and copper mine" which under certain conditions might represent a rather strong temptation for later generations. Another argument used against the employment of such large quantities of lead as filler material is that, after several hundred years of terminal storage time, the chemical toxicity of lead is greater than the radiotoxicity of the stored radioactive waste.

Large-scale research and development programs for the conditioning and terminal storage of spent fuel elements have been carried out in the United States for quite some time but the terminal storage of spent fuel elements has not yet been demonstrated--although that has been assumed on occasion. Several fuel elements were encapsulated in a big hot-cell plant at the Nevada Test Site but the containers used for that are suitable only for several years of experimental storage. Some of the fuel elements thus conditioned are then stored on an experimental basis in the Climax-Mine in granite, at a depth of 420 m. The goal of the investigations, slated to run about 5 years, is primarily to investigate the influence of heat and radiation on granite as a terminal storage formation and to compare corresponding mathematical models to the results of these tests. In the meantime, the fuel elements are being inspected and, after completion of these investigations, they are again taken up above ground. The transport and storage equipment used here is not designed for terminal storage on an industrial scale and cannot be considered representative of a terminal storage facility.

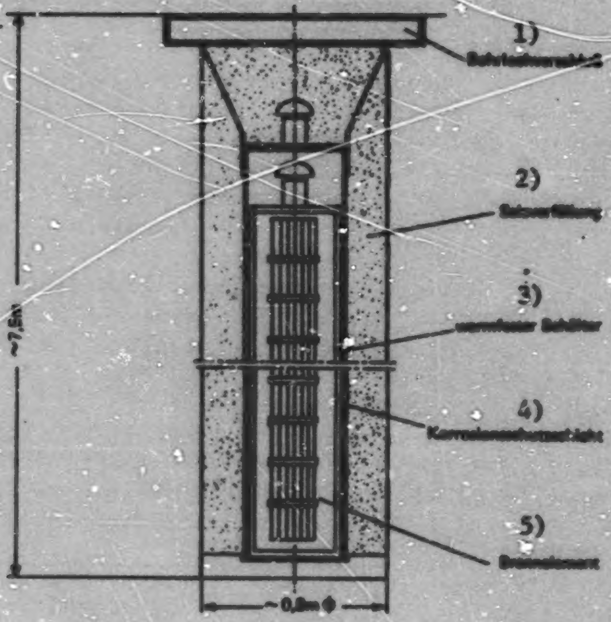

Figure 1. Terminal storage concepts for two-shell fuel element container. Key: 1--Borehole lock; 2--Salt filling; 3--Heat-resistant container; 4--Corrosion protection layer; 5--Fuel element.

3. Reference Concept in the Context of the Study Entitled "Waste Disposal Alternatives"

In order to be able to make a comparison among the two waste disposal methods in the context of the study, it was first of all necessary to design reference plants for conditioning and terminal storage of spent fuel elements, assuming salt as the terminal storage formation. The packaging of complete fuel elements was considered as reference concept for the conditioning methods because, in the area of the above-ground facilities, one may expect safety-engineering advantages compared to the integrated disposal concept only if a technically simplest possible conditioning method can be implemented. Of course, this must be weighed against the effects thus resulting as far as the terminal storage area is concerned.

The separation of fission gases from the fuel rods was not considered necessary because calculations showed that, even if we have a larger number of defective fuel rods, one can make certain through technical measures that the maximum permissible radionuclide concentration in the seals of the terminal storage mine will not be exceeded. Transport of the long and heavy waste bundles below ground undoubtedly is very expensive but it seems technically feasible and it appears to be controllable from the safety engineering angle.

There is no dispute regarding the fact that the container for spent fuel elements must perform a barrier function. This emerges already from the requirements that fission gases, released from defective fuel rods, must not get into the terminal storage mine in impermissible concentrations. It was therefore postulated that the terminal storage container must be gas-tight during the mine's operating phase, that is to say, for about 50 years. To prevent the release of the easily volatile and easily leachable radioactive fission products, such as Cs-137, which have accumulated in the gaps between the fuel and the casing, it was furthermore required that the container must remain tight until the radioactivity of the significant elements has extensively faded, that is to say, several hundreds of years.

Considering the mechanical, orogenic and thermal conditions prevailing in general terms in the terminal storage facility, a requirement was therefore established as to design criterion for the terminal storage container; the container is supposed to perform a barrier function for several hundred years at a rock pressure of 300 bar, at most, and a temperature amounting to a maximum of 200°C. Because water penetration via the shaft must be considered as a point of possible trouble in design terms, the container's barrier effect must be maintained also under these conditions. In addition to the mechanical strength, the corrosion resistance of the container raw materials thus also plays a central role.

Some metal working materials, such as, for example, certain nickel or titanium alloys can probably meet the corrosion resistance requirements for the terminal storage container. So far however only very few short-time corrosion studies have been conducted with these working materials under conditions relevant in terms of final storage; an extrapolation of working material performance over a period of several hundred years therefore is very uncertain.

Figure 1 illustrates the concept for a two-shell fuel element container. The inside, thick-wall fuel container provides for the necessary mechanical strength while the required corrosion resistance is provided by a several milimeter-thick protective layer made of the above-mentioned alloys. Compared to a single-shell container, this variant offers advantages regarding the weight, the raw material savings, and thus also the cost.

Figure 2 is a diagram illustrating the logistics behind a direct terminal storage facility for spent fuel elements; here it was assumed that the conditioning plant is at the site of the terminal storage facility. The conditioned fuel element is taken below ground, perpendicularly, in the shaft, in a transport container. The transport container is tilted at the filling station and loaded on a transport vehicle. There are no provisions for perpendicular transportation to the as much as several kilometer-long access tunnels leading to the storage tunnels because otherwise it would be necessary to dig excessively large tunnel profiles. In the area of the storage tunnel, the transportation container is stood up and the conditioned fuel element is lowered into the borehole. Here we have stiff requirements for the safe handling of the transportation containers below ground which weigh 30-40 t and which are up to about 6 m long.

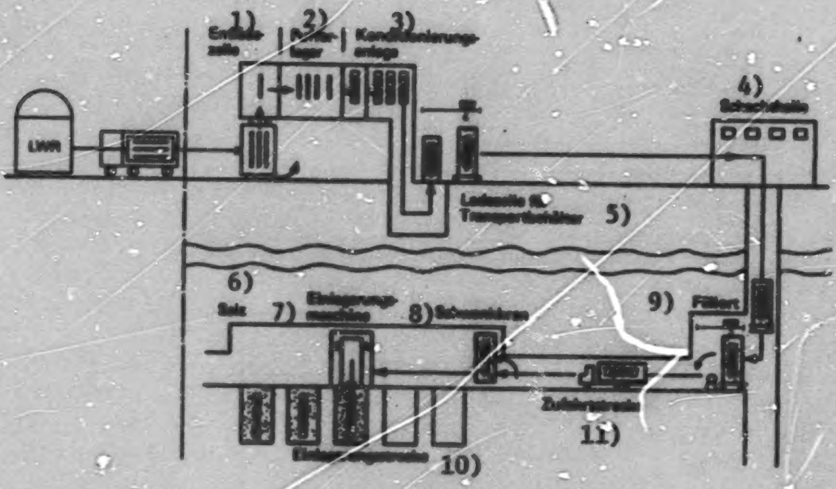

Figure 2. Logistics aspects of direct terminal storage of spent fuel elements. Key: 1--Unloading cell; 2--Buffer storage; 3--Conditioning plant; 4--Shaft building; 5--Loading cell for transport container; 6--Salt; 7--Storage machine; 8--Swinging crane; 9--Filling station; 10--Storage tunnel; 11--Access tunnel.

4. Differences between Disposal Alternatives and Problems of Direct Terminal Storage of Fuel Elements

Where now are the problems or the advantages and disadvantages of direct terminal storage of fuel elements, as compared to the integrated waste disposal concept? Because this article is so short, we can only briefly go into some of the points involved here.

Let us first of all look at the current state of the art. In the concept on reprocessing we were able extensively to fall back on many long years of experience and tested technologies; on the other hand, the technique of conditioning and terminal storage of fuel elements remains yet to be developed to a considerable extent; in particular however it must be tested whereby of course we cannot recognize any technical reasons as to why this concept should not seem feasible. Because comparatively only few hardware developments were carried out in this field worldwide, the ability to fall back on prior developments and experiences in other countries will be rather limited.

On the other hand, in conditioning fuel elements, we can to a considerable degree resort to already existing techniques. The technical effort and the complexity of a conditioning plant are undoubtedly less than in the case of a reprocessing plant. Considering all of these aspects, large-scale industrial use of this disposal method--with consistent implementation of the required work--does not appear unlikely within 20 years after a corresponding decision from the technical viewpoint, whereby of course we do not know what requirements the licensing authorities will set up for such a concept. One essential difference between the two waste disposal concepts resides in the waste volume to be brought in for final storage. A comparison shows that, when we condition fuel elements, we get larger volumes of highly radioactive waste but on the other hand we also get considerably smaller quantities of medium-radioactive and slightly radioactive waste than during reprocessing. Initial estimates for the reference concept selected in the context of the study show that the volume of conditioned fuel elements is about ten times greater than that of the corresponding highly radioactive glass blocks. In contrast to that, the volume of the slightly radioactive and medium-radioactive waste barrels to be stored in the case of reprocessing is higher roughly by a factor of 100 than during the conditioning of fuel elements. Reasonably reliable data on the attendant differences in the radioactive exposure of operating personnel however are possible only if we have more detailed concepts for the containers and for the handling and transportation equipment.

Next we might briefly go into the question of the stability of the terminal storage products. While we already have numerous results regarding the performance of the vitrified highly radioactive waste under conditions relevant in terms of final storage, we know considerably less regarding the performance of spent fuel under terminal storage conditions.

Because the available investigation results did not permit any statements regarding the performance of spent fuel in brine at higher termperatures and pressures, initial leaching experiments were conducted for guidance purposes under reproduced terminal storage conditions, in the context of the study, using fuel element samples with a burnup of 31,000 MWd/t.

From these results we can draw the rather cautious conclusion that--apart from the fast leaching of the fission products accumulated between the fuel and the casing--under comparable conditions, the burnt-up fuel in the brine, under temperature and pressure conditions relevant in terms of final storage, reveals a performance that is no worse than borosilicate glass. Whether this applies also to longer leaching times is a question that can be answered only after longer-lasting leaching experiments.

Another essential difference between the two waste disposal concepts consists in the fact that, in the case of direct terminal storage of spent fuel elements, about 50-100 times the quantity of uranium and plutonium is placed in the terminal storage, compared to the reprocessing waste. This raises questions as to the risk of a criticality accident, the consequences of the higher heat stress, as well as the higher radiotoxicity and finally the surveillance of the terminal storage facility under the provisions of the atomic test ban treaty.

Regarding criticality safety, salt as a terminal storage medium for spent fuel rods offers advantages over other geological formations because chlorine is a strong neutron absorber. The danger of criticality, by the way, is only if, after the corrosion of the containers and the dissolution of the fuel, there is a selective enrichment of plutonium from many fuel elements. Such a process is highly unlikely.

Regarding the heat quantity given off by the waste in the terminal storage facility, it is understandable that the fuel element, on the basis of the unseparated plutonium, especially looking at it over longer period of time, will have a definitely higher heat release figure than the reprocessing waste; specifically, it will be about twice as high after 100 years, as we can see in the upper portion of Figure 3.

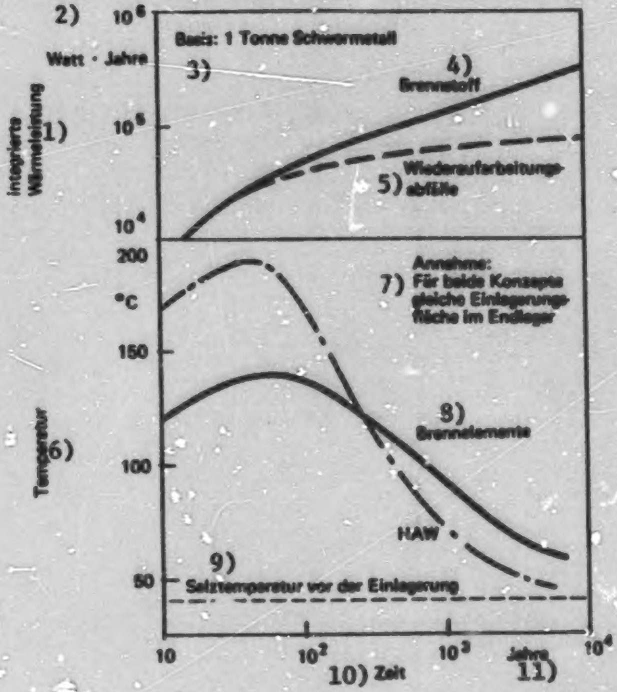

Figure 3. Integrated heat output and temperatures at surface of waste containers. Key: 1--Integrated heat output; 2--Watts x years; 3--Basis: 1 t of heavy metal; 4--Fuel; 5--Reprocessing waste; 6--Temperature; 7--Assumption: same storage surface in terminal storage facilities for both concepts; 8--Fuel elements; 9--Salt temperature prior to storage; 10--Time; 11--Years.

The temperature distribution, resulting from heat release, in the terminal storage area, as a function of the place and time, quite understandably depends heavily on the storage density and the storage geometry. Moreover, in the case of reprocessing, we to some extent have widely differing specific heat output figures; this is why a comparison of thermal aspects of a terminal storage facility for spent fuel elements with those of a terminal storage facility for reprocessing waste is possible and would make sense only to a limited degree. Without going into any greater detail here on the general conditions, we have, in the lower part of Figure 3, the temperature at the surface of the containers for spent fuel elements as well as vitrified waste in the terminal storage facility as a function of the storage time, such as this can be calculated for an example under the specific marginal conditions used as basis in the study.

One frequently mentioned disadvantage of direct terminal storage of fuel elements --which can be traced back to unseparated uranium and plutonium--is the higher radiotoxicity of the waste. Figure 4 illustrates the radiotoxicity index for both waste products, in this case referred to as "ingestion hazard," in terms of its development over a period of time. Here, the "ingestion hazard" is determined by weighting the radioactivity of the nuclide mixture with the maximum permissible concentration of the individual radionuclides in drinking water. We can see that toxicity index of the reprocessing waste after a longer period of time is lower by a factor of 10-100 than the spent fuel elements. For waste from reprocessing of elements with recycled uranium and plutonium, the difference is less pronounced over a longer period of time. Figure 4 does not yet consider the new ICRP values according to which the MZK [average decay coefficient] for radium-226 is smaller by a factor of about 5-7. This means that the curves of radiotoxicity for spent fuel and reprocessing waste approach each other but the long-term hazard potential of spent fuel elements in every case is definitely higher than that of the corresponding reprocessing waste.

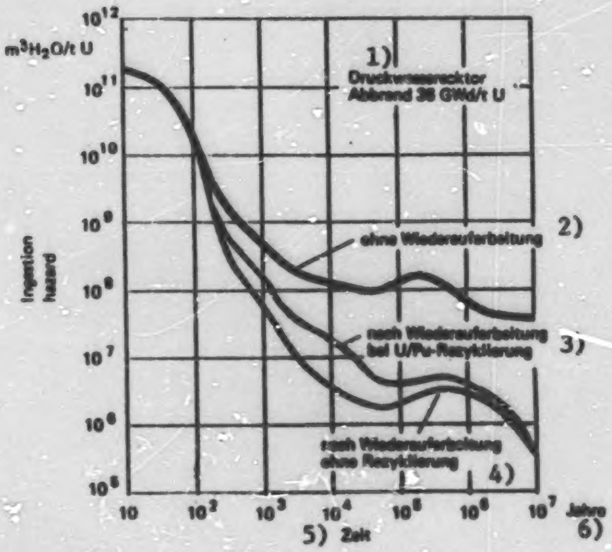

Figure 4. "Ingestion hazard" of spent fuel and highly radioactive waste after reprocessing. Key: 1--PWR, burnup 36 GWt/t U; 2--Without reprocessing; 3--After reprocessing with U/Pu recycling; 4--After reprocessing without recycling; 5--Time; 6--Year.

A statement regarding the hazard springing in fact from a terminal storage facility cannot be made only on the basis of the consideration of the radiotoxicity but requires a consideration of the release possibilities and transportation processes whereby it is a good idea to distinguish between the storage phase and the phase during which the terminal storage facility is sealed.

The analyses so far conducted regarding radionuclide release from a filled-up terminal storage facility show that the resultant radiation exposure of the population for both terminal facilities is definitely below the permissible doses so that in this respect there are gradual but no basic differences between fuel elements and reprocessing waste in terminal storage.

Regarding the effects of trouble during the operating phase of the terminal storage facility, we do not have sufficient analyses available so far to be able to make a quantitative comparison between the two waste disposal variants from that angle.

What is the status of the two waste disposal concepts, under present-day conditions, from the viewpoint of proliferation which after all, for President Carter, was the essential reason for promoting the direct terminal storage of fuel elements? The INFCE (Nuclear Fuel Cycle Evaluation) on that issue arrived at the conclusion that one can fundamentally counteract the abuse of reprocessing plants and plutonium processing plants with technical means, safety checks, and institutional measures. While safety controls for waste types from reprocessing and refabrication probably can be completed already prior to terminal storage, it is not clear whether and how long a terminal storage facility for spent fuel elements must be watched so as to prevent any misuse of stored nuclear fuels. So far there is no corresponding surveillance concept.

There is no disputing the fact that, in a comparison of the two disposal methods and the corresponding decision, energy-policy questions play a very central role along with technical and safety-engineering aspects. Looking at it in energy-policy terms the direct final storage of spent LWR fuel elements signifies the final renunciation of valuable energy raw materials and correspondingly a considerable additional requirement for natural uranium to supply the LWR. The introduction of fast breeder reactors--which in medium-range terms would lead to independence regarding the supply of uranium--after such a decision would probably no longer be possible. Waste disposal and supply aspects cannot be separated from each other here.

We know that it takes several decades until the uranium savings--which are technically possible through uranium and plutonium recovery in thermal and fast reactors--will yield results and that this span of time among other things keeps growing longer due to the time shift in reprocessing and the resultant longer time the fuel elements are out of the core. It would therefore be also completely wrong to conclude from the fact, that the uranium savings or the additional uranium requirement will be small in short-range terms--depending upon which alternative we pursue--that we have any amount of time available before we have to make our decision because the consequences will emerge to the fullest extent only in a few decades. This brings up a point on which we do not agree with A. Pfeiffer (2), that is, the proposal for "recoverable terminal storage." So far there is no technical concept that can be identified with this proposal but it is based on the endeavor to keep the option for breeder introduction open as long as possible even without reprocessing. The in itself contradictory requirement for "recoverable terminal storage" seeks to combine the contrary goals of intermediate storage, that is, safe preservation, limited in terms of time, plus terminal storage, with maintenance, free, indefinite, safe elimination for a matter of centuries--in order to facilitate the political decision regarding the final renunciation of energy raw materials through an apparent option in favor of their recovery. Keeping open the option of recoverability of spent fuel elements stored in geological salt formations is something which can be secured only along with grave safety-engineering disadvantages and is not compatible either with the required design of the terminal storage facility against the kind of trouble represented by "water penetration through the shaft." This kind of terminal storage therefore must be rejected already for security reasons.

5. Further Activities in the Field of Other Waste Disposal Techniques

Building on the results of this study and with the cooperation of a group of experts, the federal research and technology minister at the end of 1980 formulated the research and development target under the heading of "Miscellaneous Waste Disposal Techniques." It extends between 1981 and 1984. The money required was estimated at DM 60 million for the entire time. Specifically, the following topic areas are to be worked on in the context of this research and development target program:

Development of conditioning concepts,

Terminal storage questions,

Experimental individual investigations,

System and comparison investigations.

In the context of the development of conditioning concepts, a reference concept is to be selected for a packaging technology according to German safety standards from the large number of possible methods by the middle of 1982; this concept would then be worked out in detail during the years thereafter. In looking at the terminal storage questions, we are primarily concerned with establishing the safety of a final storage facility for spent fuel elements. These two topic areas are supplemented by experimental individual investigations.

The system and comparative investigations will be handled by a PAE (Miscellaneous Waste Disposal Techniques Project Group), which has been established at the Karlsruhe Nuclear Research Center and which will be the project manager here; this group among other things will be responsible for the preparation of the comparison of the various disposal methods in terms of method and content. Beyond that, the project group supports the BMFT in taking on and coordinating all agencies working on individual tasks. The group is staffed in an interdisciplinary fashion and consists of personnel from the Karlsruhe Nuclear Research Center as well as various companies.

It is obvious that there cannot be any demonstration of this waste disposal technology in the short project running time allocated; in other words, this can be done neither in the FRG, nor in any other country; this means that the pertinent decision--regarding the technical comparison--will over the next several years always have to start with a differing development level of these concepts. We have tried to present a short overview of the technical status as well as the various problems of direct terminal storage in comparison to the integrated waste disposal concept. Active scientists and engineers will do everything to make it possible for the policy makers to make the decisions during the middle of the eighties. But one thing we cannot do is to relieve the policy-makers of the responsibility for this far-reaching decision.

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Authors' address: Prof. Dr. Ing. H. Boehm, Dr. K. D. Closs, Kernforschungszentrum Karlsruhe GmbH, Postfach 3640, 7500 Karlsruhe. Revised version of overview lecture delivered at the annual conference on nuclear technology of the German Atomic Forum and the Nuclear Engineering Society, Duesseldorf, 24-26 March 1981.

Community Aspects of Waste Disposal

Duesseldorf ATOMWIRTSCHAFT ATOMTECHNIK Jul 81 pp 431-434

[Article by A. Pfeiffer: "Social and Technical Aspects of Waste Disposal"]

[Text] The position of the German Federation of Labor and its member unions concerning waste disposal, based on joint responsibility for overall economic and social development, including environmental protection, is aimed at meeting the residual energy needs through nuclear energy. This results in a wait-and-see attitude in line with those recommendations of the inquiry commission which suggest that the major decisions regarding fundamental waste disposal principles be made only at the beginning of the nineties. In between, the emphasis is to be on extensive intermediate storage of spent fuel elements. Regarding an overall situation, the DGB [German Federation of Labor] expects that we will have a long way to go which must be accompanied by constructive discussions of all aspects of waste disposal and its effects on society and the environment. The Editors.

Introduction

The real significance of waste disposal can be properly outlined only with the help of several dimensions which in part are being advocated by differing segments among the West German population. The concerns of the national economy and of enterprise management, health aspects, ecology, the social concerns for job security, and the moral responsibility for future generations must be considered in each case and this is characterized, in an energy-policy situation, by the following:

Oil price rises,

National coal policy and

The controversy over the fundamental pro's and con's of nuclear energy with demonstrations that cannot be overlooked; in this connection I am not sure to what extent the demonstrators are really sustained by a uniform determination and will. At least in a small portion it becomes clear that the real thrust is not nuclear energy but our system of government and society as such. But this will not be further covered here.

In the dispute over the peaceful uses of nuclear energy, questions on security and waste disposal play an important role in addition to questions regarding our future way of life and its development; this applies also from the aspect of the technical, political, and legal quality in the preparation and implementation of decisions which after all do alter our society. It seems worth investigating whether a technology with the dimensions of nuclear energy, for example, can be implemented through administrative guidelines or criteria that are not legally binding and that do not have any binding effect on the citizens. Here we might possibly run into the fundamental causes of the stagnation in investments.

The construction of nuclear plants was relatively slow in the FRG. In 1980, the electric current generation share came to about 12 percent; it thus represents no dominant factor but nevertheless it is a weighty and growing factor.

About 30,000 persons, whose radiation exposure is being monitored, are employed in the nuclear energy sector. In the medical sector we must add the same number of persons. Considering enterprises for the construction and maintenance of nuclear technology plants, this employment effect is multiplied several times over.

At this time, ten nuclear power plants in the 1,000-Mw class turn out about 300 t per year of spent fuel elements plus 1,500 m^3 of miscellaneous radioactive waste. In 1979, we obtained about 35,000 m^3 of radioactive waste from medicine.

Considering the by no means minor hazards deriving from such waste, questions as to its treatment and disposal have become ever louder in recent years. The combined issues of waste disposal and additional construction of nuclear power plants developed from that in the political sphere.

The energy industry of course reacted late but when it did, it did so with great impetus. We created the "Gorleben" integrated waste disposal center, with intermediate storage, reprocessing, and terminal storage in one place. Intermediate storage and reprocessing here were to be under the responsibility of the energy industry while terminal storage was to be the responsibility of the federal government. This choice of a concept concentrated in one place was explained in the light of the safety-engineering, ecological, and economic advantages connected with waste disposal for LWR. This brings us to the following question: was there really a comparison with alternate waste disposal concepts?

The selection of the Gorleben site is a chapter in itself. As we know, the experts have submitted three proposals; the political authorities added a fourth, that is, Gorleben.

The Reactor Safety Commission and the Radiation Protection Commission confirmed the fundamental safety-engineering feasibility of the waste disposal center--although, of course, without any final knowledge regarding the nature of the salt dome. The Lower Saxon state government in May 1979 rejected the reprocessing project components in the integrated waste disposal concept. The question as to reprocessing and the most practical form of terminal storage might be taken up again if one could anticipate whether the FRG would in the future decide on LWR, HTR, or fast breeders. By then, we should establish intermediate storage facilities and the search for terminal storage facilities as well as the development, exploration, and opening of the salt dome should be pushed. This concept, it was maintained, would permit safe waste disposal.

This decision clearly shows that the manner of waste disposal depends primarily on energy-strategy intentions, that is to say, on the use of reactor systems.

The exploration of the salt dome has begun in the meantime. But drilling is being done only in Gorleben. The question "What happens if the salt dome is not suitable?" thus is highly significant. Initial results as to the structure of the salt dome are available.

In September 1979, the heads of government on the federal and state levels entered into an agreement which starts with the idea of being able to decide between the waste disposal alternative under the heading of "direct terminal storage of spent fuel elements," on the one hand and the alternative under the heading of "terminal storage after reprocessing," on the other hand, by the middle of the seventies in the light of safety considerations. Theoretical investigations here seem to be considered adequate in decision-making regarding "direct terminal storage." The Karlsruhe Nuclear Research Plant was directed to translate the agreement between the federal government and the states into action.

Last year, the German electric power industry submitted offers or inquiries concerning the erection of several reprocessing plants for the purpose of "waste disposal" for LWR in various federal states. The local distribution, in contrast to the line of argument used in connection with Gorleben, is not supposed to entail any safety disadvantages but instead is supposed to mean that the risk would be spread around.

Early in 1979, the German Lower House established a "Future Nuclear Energy Policy" committee. The essential goal was the preparation of decisions regarding the breeder reactors policy, the pertinent fuel cycle with reprocessing, and the attendant effects on society. An interim report was submitted in June 1980.

Of course we are not saying anything new in describing this background situation; but we do want to make it clear that the occasionally demanded "energy policy without any ifs and buts" really does not exist in a democratic country and cannot exist there.

How did public opinion formation inside the DGB develop on the waste disposal issue against this background? What evaluations did we come up with?

Position of DGB and Its Member Unions

The labor union position on the problem group of nuclear waste disposal was developed and consolidated in a long-drawn-out process of opinion formation starting in 1976, whereby--in spite of all resolutions until then adopted unanimously by the resolution-adopting body--one should and cannot rule out the possibility that the continuing discussion among the public or new discoveries could also trigger new debates among us. This is something which a democratic organization must always figure on. The obligation of the DGB and its member unions to participate in the fashioning of energy-policy decisions springs from the following:

1. From the shared responsibility for economic and social development as a whole, that is to say, especially for the recovery and guarantee of lasting full employment;

2. From the responsibility for consistent and effective environmental protection;

3. From responsibility for jobs or workers directly involved by the practical implementation of certain energy-policy concepts;

4. From the responsibility for humane and safe working and living conditions of persons employed in the energy industry;

5. From the responsibility of industrial nation for the improvement of the economic and social situation of the developing and threshold countries.

The position adopted by the DGB federation executives in April 1977 on "Nuclear Energy and Environmental Protection" starts with the idea that, in spite of energy savings, increased coal utilization, and the development of new energy sources, it is generally impossible to do without the use of nuclear energy at this time. Concerning waste disposal, the nuclear energy industry must be obligated to submit a reliable and economical concept whose costs fundamentally must not burden the public budget. No construction licenses should be issued for new nuclear power plants prior to the issue of the construction permits for the reprocessing plants.

This tie-in of reprocessing and additional nuclear power plant construction was modified in the autumn of 1977. Today we occasionally get the impression that absolute advocates of nuclear energy would love to have this old, energy-strategy-oriented combination once again.

In May 1978, motions 105 and 106 of the DGB Federation Congress were approved. The solution of the waste disposal problem accordingly among other things is the prerequisite for the construction and operation of additional nuclear power plants. The resolution starts with the idea that the prerequisites can be considered as having been met if:

We have permits for the construction of intermediate or initial input storage facilities and

We have suitable salt domes available for final storage.

The reprocessing of spent fuel elements was deliberately not included in these prerequisites for reasons which we will go into later on.

On account of the central role played by the problem of waste disposal regarding the attitude of the labor unions on the large-scale industrial use of nuclear energy, there was an intensive study together with the political but also with the technical questions of waste disposal within the DGB labor unions but also after the resolutions were adopted at the 1978 DGB Congress. It turned out that, in jurisprudence, the solution of the waste disposal question increasingly was made the prerequisite for the further expansion of nuclear power plant capacities in the FRG. Here, emphasis was primarily placed on intermediate and terminal storage but not on reprocessing. Examples from foreign countries showed that concepts with long intermediate storage time and without direct decision on reprocessing are being discussed more seriously there and are partly being tested experimentally.

In connection with reprocessing plants, we ran into a large number of unanswered political and safety-engineering questions. These questions caused the DGB labor unions to go into a comprehensive critical review of the integrated waste disposal concept submitted by the federal government.

Political decisions in Lower Saxony in point of fact have brought about a shift in the decision on licensing for reprocessing. Sticking to the concept of an integrated waste disposal center thus could lead to a critical bottleneck for a possibly necessary expansion effort but also for the further operation of the LWR. In September 1979, the DGB Federation executive committee reacted to this new situation among other things with the following evaluations and proposals:

Whether the DGB demand for a safe waste disposal concept has been met through the integrated concept presented by the federal government is something that could be answered satisfactorily only after additional research work was available. It was considered doubtful whether the integrated waste disposal concept constituted the optimum solution from the safety angle.

The decision as to an economical waste disposal concept could be made only after the decision had been made on the large-scale industrial use of advanced reactor lines above all with regard to the fast breeder. For this purpose, the inquiry commission established by the Lower House would have to work out the necessary foundations. In connection with the sole use of LWR of course one cannot expect reprocessing to be economical. This in turn creates the necessity for including other solutions for waste disposal in this review--solutions which at least initially will get along without reprocessing.

In terms of time sticking to the integrated waste disposal concept--which originally was aimed at a considerably faster introduction of breeder technology--could, according to our current level of knowledge and the changes in political will formation, likewise turn out to be a bottleneck for energy supply. From the labor union viewpoint this would not only in short-range terms endanger the jobs of people employed in power plant construction but in longer-range terms, economic growth as a whole might even be hindered; this in turn would have grave negative effects on the employment situation.

Considering these aspects and the technical possibilities connected with the implementation of waste disposal, there would arise a clear need for including other solution possibilities, in addition to the integrated waste disposal concept, in these consideration. Here, the DGB unions criticized the fact that scientific analyses and experiments, which are necessary for this purpose, so far have hardly been conducted by the time the decision was made.

An alternative might look as follows:

Longer storage time in nuclear power plants or in the intermediate storage dump, followed by transportation, final treatment, and (recoverable) terminal storage.

To avoid bottlenecks, the solution possibility should be seriously examined and the prerequisites for a final evaluation should be created through corresponding research and development work.

So much for the resolution situation in September 1979 whose development likewise was illustrated in somewhat greater detail in order to show how a socially relevant grouping, such as the labor unions, must also constantly react to political and technical developments.

The reactions to this proposal were manifold and presumably often too hasty.

From the safety-engineering viewpoint, the direct terminal storage of spent fuel elements was considered the most unfavorable thing to do, in other words, it was hardly a justifiable solution. Question: were there any analyses that justified this kind of reject? Or, putting the question differently: should we not at least have had a debate with the American study of the EPRI?

Reprocessing is supposed to be economical already for LWR. Today we are more cautious with that and reprocessing is mostly considered a part of the fuel cycle in new reactor systems.

Reprocessing would reduce the waste volume. But analyses show that all of the waste after reprocessing would require a larger volume capacity.

Reprocessing supposedly has been demonstrated whereas direct terminal storage has not. Question: in comparing waste disposal alternatives, must we not compare the terminal storage of the waste from reprocessing to the direct terminal storage of fuel elements?

The recoverability of waste together with terminal storage is supposed to be a contradiction. But could not, for example, on the basis of the presently limited level of knowledge regarding the salt dome, a recoverability with a time limit on it be of use?

Direct terminal storage is considered to be an unnecessary, politically forced development which would not be used anyway and which would only complicate and delay waste disposal. Question: do we not know that, in the case of processing likewise, about 30 percent, among other things, of recycled fuel elements, must be directly brought to the terminal storage facility?

It is not my intention here to accuse anybody with these not exactly happy experiences. Instead, it seems necessary to defuse such technological and political land mines--which after all at some point in time can blow up to the detriment of all of us--at the right time. I am addressing a request to the experts to help us here through precautionary methods. Openness, not tact is called for here!

Proposals of Inquiring Commission

The inquiry commission of the Eighth German Lower House on "Future Nuclear Energy Policy"--in which I was able to participate--in addition to proposals on reactors safety and breeder reactor technology, also submitted recommendations on waste disposal. The corresponding majority recommendations are contained in a compromise of energy-policy action possibilities which in my opinion is carefully balanced. One objective here was to arrange energy-policy decision needs in the form of technically clear and politically feasible packages. To put it simply, there are three packages here:

In the first package we put, in addition to the utilization and the moderate expansion of LWR, the increased utilization of energy saving, renewable energy sources, and coal.

In the second package we have studies and demonstration plants which are necessary for compact waste disposal for LWR and those which serve for the development of the compact fuel cycle in LWR and breeders and their waste disposal.

The third package encompasses the initial proposals on investigations and criteria which might be helpful in decision-making on the large-scale industrial utilization of breeder reactor systems.

Packages 1 and 2 contain current decision-making needs. The decision on package 3 is to be made during the nineties. This is justified by unanswered economic, technical, and social questions. These questions can be cleared up in a more competent manner after the collection of experiences both with the energy saving efforts and with the new reactor systems.

Anybody who believes that this kind of action is nothing but clever tacking in order to avoid decisions, must also allow himself to be asked some questions, such as, for example: who knows today what a kilowatt hour of energy from varying sources --for example from breeders or solar plants will cost? What about the growing safety requirements? Who can tell which technology can be introduced more or less properly according to the rules of the free-enterprise system? How are public promotion funds going to fit into that? What technology is better compatible with the principles of a democratic government of laws? Where do we have the least social-policy conflicts?

One likewise cannot see why, in our country which is poor in raw materials, the intensive utilization of energy savings and renewable energy sources, on the one hand, and the long-term use of nuclear energy, on the other hand, should constitute incompatible contrasts. On the contrary: the DGB is of the opinion that these two components can be combined into one energy supply structure which combines great crisis resistance and adequate low-cost quantitative supply. I would bet that such a structure would be politically supported by the large majority of our population. I furthermore bet that we can convince several thousands of the doubters and the fearful--but not the hard core of the absolute nuclear energy foes--as to the correctness and necessity of such an energy structure if the necessary steps are taken sincerely and consistently in every day action.

In tackling the critical question of waste disposal from LWR this means that we must make a precise distinction between supply-strategy and disposal-strategy steps. From the plant management and supply-strategy viewpoints, the intermediate storage of fuel elements is enough for waste disposal from LWR; only breeders need reprocessing in addition. A socially acceptable waste disposal strategy on the other hand must include terminal storage.

We can see that the manner of waste disposal is primarily an energy-strategy and thus a social-policy decision. The improvement of the balance of enterprise-management and social-policy interests--as indicated in the first and second packages of the inquiry commission recommendation--could be a key to the political acceptance of nuclear energy--and that is certainly my conviction.

Specifically, there are 12 recommendations which require action in connection with waste disposal. Here are some of them:

Intermediate storage of fuel elements should be implemented briskly.

A pilot plant for the conditioning and direct terminal storage of unprocessed fuel elements should be developed to the point of industrial readiness. The idea here is to test recoverable terminal storage and to demonstrate the fact that intermediate storage facilities can be handled in terms of proper waste disposal.

The suitability of the salt dome in Gorleben and alternate locations for a terminal storage facility must be established through exploratory drilling.

A reprocessing plant should be built and its size should be determined on the basis of predetermined criteria in an expert report.

The quantity of plutonium to be processed in the meantime must be guided by the quantity of plutonium needed for the further development of the fuel cycle in LWR.

The recoverability of waste from the salt dome should be examined to find out whether a conversion of dangerous substances into less dangerous ones becomes possible.

The classification and consequently the conditioning of waste must be adapted to the safety objectives of protection for the population.

From the official reaction and partly also from the interpretation of the commission findings by various groups--on both sides of the energy front--one often unfortunately can detect a deliberately onesided emphasis on certain partial results. This means that the balance within the individual packages of the commission recommenations is upset in a rather negligent or deliberate fashion. But the tender little seedling of consensus requires much greater care!

It seems that we have a long way to go in constructive discussions and also through an additional commission work phase. The result in the final analysis depends on all of us, that is to say, on the manner in which we deal with particular energy-policy opponents--sincerely, ready to compromise, and thus able to come up with a consensus and struggling to achieve convincing majorities, or in an emotional and incalculable way, in the manner of a religious war. Nuclear energy and our system of government and society cannot tolerate the latter.

In the commission I emphasized that it is not a matter of indifference to me whether 5,000 or 500 persons have to be carried away from the site of a nuclear plant! In the final analysis, the workers--who can do little to determine the developments of technology--wind up in an unacceptable field of tension between enterprise, economic and social-policy interests.

Workers and their representatives try, in the energy discussion between apparently irreconcilable viewpoints, to build bridges because they have a feel both for economic and for social-policy necessities. Attempts to misuse the workers and their representatives as alibi, try to make sure that they will not really participate in the decisions, or taking some of their increasing rights away from them, would run into resistance. To make clear what I mean, I might merely refer to the absence of accident prevention regulations among the professional associations in nuclear technology, the unsatisfactory manning of bodies, such as the Nuclear Technology Committee, and the personnel inspections which clash with the enterprise constitution law.

We are not taking this lightly. It is not man who must first adjust to technology, it is technology that must be adjusted to man! After all, in the final analysis, it is supposed to serve the welfare of man!

I would like to ask the experts to concern themselves even more intensively with the discovery and elimination of existing conflict potentials and in their scientific-technological work carefully to distinguish between technical facts of life, between pertinent assumptions, and political decisions. Self-imposed restrictions and the unevaluated disclosure of action possibilities for nuclear engineers will help make sure that the public and the political establishment will not be caught in a more or less justified crisis of confidence [credibility gap].

Nobody must get the impression that important safety criteria can be altered after the fact in order, for example--as has been stated at the time--to make tolerable an after all incomplete ground water seal in a salt dome. If this rumor is false, then it should be countered through the disclosure of the facts.

I have a great degree of confidence in the thoroughness of our experts. Constant proximity to the facility reduces the fear but can also narrow a person's field of vision. We live in a democratic country in which every politician needs majorities if he wants to push his policy through. The energy issue can become a vital issue for all of us which we must master. Let us therefore continue to work on it so as to find the correct way, the best methods, and let us thus develop a steady population majority in favor of a reasonable and logical energy policy.

Author's address: A. Pfeiffer, Mitglied des Geschaeftsfuehrenden Bundesvorstandes des Deutschen Gewerkschaftsbundes, Hans-Boeckler-Str. 39, 4000 Duesseldorf. Revised version of overview lecture delivered to the Annual Nuclear Technology Conference of the German Atomic Forum and the Nuclear Enegineer Society, held in Duesseldorf on 24-26 May 1981.

Union Views on Waste Management Discussed

Duesseldorf ATOMWIRTSCHAFT ATOMTECHNIK in German Jul 81 pp 435-439

[Comment by Nuclear Technology Team of IG [Industrial Labor Union] Metall and OeTV [Public Service, Transportation and Communications Labor Union]: "Nuclear Power Plant Waste Disposal from the Labor Union Viewpoint"]

> [Text] After a lengthy political and technical discussion, the DGB unions arrived at the opinion that, regarding waste disposal for nuclear power plants in the FRG, it would be necessary, in addition to the waste disposal concept with reprocessing, also to investigate the possibility which is referred to by the term of "recoverable terminal storage" of spent fuel elements. This viewpoint was determined by the DGB executive committee of 4 September 1979. The basis for this demand, which continues to be advocated, among other things, is a status report from the AGK (Nuclear Technology Team) of IG Metall and OeTV. The AGK in the following presents its analysis on the disposal situation and the conclusions which lead to the demand for waste disposal alternatives. The Editors.

1. Introduction

The above increases in petroleum prices since 1973 and the energy supply problems, which kept growing during the years thereafter, persuaded the DGB unions to go much more deeply than before into this group of topics.

The DGB starts with the following basic concepts (1, 2, 16, 18) in an effort to work above all to secure the requirements and thus full employment, to minimize health and environmental risk, and to save raw materials in conjunction with energy supply.

Energy savings, promotion of coal, for example, as a domestic energy source, and the expansion of nuclear energy which must be confined to the absolutely necessary scope.

Here one must furthermore consider the utilization of differing employment effects deriving from various energy sources designed to improve the overall economic employment situation.

The use of nuclear energy is connected with the requirements for guaranteeing waste disposal.

The AGK of IG Metall and OeTV in 1978 completed a status report on nuclear power plant waste disposal (3) whose main points were made public (4, 5).

The statement to the effect that the reprocessing of spent nuclear fuels for nuclear power plant waste disposal equipped with LWR is not urgently necessary for economic and ecological reasons, but rather that this material can be placed directly in a final storage facility, triggered a lively (6, 7, 8) and occasionally polemical discussion.

In May 1979, the Lower Saxon state government decided that an integrated waste disposal center with a reprocessing plant was feasible in safety-engineering terms but could not be pushed through in political terms. It did not see any need either for starting with the construction of a reprocessing plant so long as the decision on the fast breeder had not yet been made. On the other hand, it judged the longer-term intermediate storage and direct final storage of spent fuel elements to be basically possible (9).

In July 1979, the federal research and technology minister asked institutions and organizations--including the DGB and individual unions--for comments on the integrated waste disposal concept of the federal government and for a reaction to the entire waste disposal issue.

In September 1979, the DGB Federation executive committee, in coordination with the individual labor unions, defined the labor union position on the nuclear waste disposal problem area (10). An edited and revised status report by the AGK (11) was used for further explanation. In its resolution the DGB federation committee among other things pointed out that it is necessary seriously to examine the (recoverable) final storage of spent fuel elements. It called upon the federal government to make sure that the prerequisites for an evaluation of the various waste disposal possibilities would be created through corresponding research and development work.

2. Individual Nuclear Power Plant Waste Disposal Steps

Waste disposal for nuclear power plants includes the following:

Radioactive operating waste,

Spent fuel elements,

Radioactively contaminated parts and shutdown waste.

Intermediate steps are possible during waste disposal. Waste disposal of course has been accomplished only after the harmful nuclear substances have once and for all and lastingly been taken out of the biocycle, that is to say, after they have been placed in a terminal storage facility.

In 1976, the federal government and the Lower House, in connection with the amendment of the Atomic Law, determined that the builder and operator of plants in which nuclear fuels are handled must make sure that any developing radioactive residual substances, as well as removed or disassembled radioactive plant components are to be used without any harm to anyone or--to the extent that this is impossible or economically unjustifiable according to the state of the art--that they are to be removed in an orderly fashion as radioactive waste (Article 9a, Atomic Law). This was the way the causal agent principle was spelled out in the law.

The heads of government on the federal and state levels ordered the basic principles of waste disposal measures, dated 1977, to be revised by the joint federal and state committee on atomic energy and they agreed on the adjusted principles in February 1980. The federal interior minister announced the results in March 1980 (12). It must be kept in mind that the old (1977) and the new (1980) principles for waste disposal may serve in nuclear power plants--which are supposed to spell out the specific provisions of Article 9a, Atomic Law, in terms of content--do not compellingly describe any specific technique or sequence of steps involved in individual engineering solutions in the course of waste disposal. Alternate solutions are permissible.

There are in the final analysis two alternatives for waste disposal involving spent fuel elements.

1. Integrated waste disposal concept.

2. Storage in nuclear power plants--transportation--storage in intermediate dump --(possibly, transportation once again)--reprocessing--nuclear fuel processing--waste treatment--intermediate waste storage (for example, HAW solutions and HAW glass, pressurized gas bottles)--final storage.

2. Step Concept

1st step: longer storage time (compact storage in nuclear power plant and/or after transportation, storage in intermediate dump)--transportation--conditioning--(recoverable) terminal storage.

2nd step (after political evaluation of fast breeder likewise): reprocessing--nuclear fuel processing--waste treatment (possibly intermediate waste storage)--terminal storage.

We will describe individual steps in both waste disposal alternatives and their technical readiness in the following chapters.

Table 1. Civilian Plants for the Reprocessing of Spent Fuel Elements from LWR (1980)

Plant	Operating time	Maximum capacity t uranium/yr	Processed t uranium
NFS (USA)	1966-1972	300	245
Windscale 2 (Great Britain)	1970-1973	400	100
Eurochemic (Belgium)	1966-1974	80	170
UP 2 (France)	since 1976	800	250
WAK (FRG)	since 1970	35	55
Tokai Mura (Japan)	since 1977/78	200	79

2.1. Transportation of Spent Fuel Elements

The transportation of spent fuel elements in special containers has been adequately tested. In the FRG alone there have been about 400 such transport shipments without any trouble so far.

The transportation containers are tested according to the IAEA, category type B (U), specifically:

Dropping from a height of 9 m on a stable foundation,

Drop from a height of 1 m on a prong,

Action of fire with a temperature of 800° C for a period of 30 minutes,

Storage in 15-m deep water for 8 hours.

Impressive experiments show that transportation containers can also withstand transportation accidents (13):

Drop test from a height of up to 40 m,

Crash of transport vehicle at a speed of 98 km/hr and 135 km/hr against a rigid concrete wall,

Right-angle collision on a railroad grade crossing with a locomotive at 131 km/hr,

Drop from helicopter at altitude of about 600 m.

2.2. Storage of Burnt Fuel Elements

The storage of spent fuel elements from various reactor types

With water cooling in storage basin is a method that has been tested in nuclear power plants and in separate fuel element dumps (FRG, France, Great Britain, Canada, the United States, USSR, etc.) and there are experiences with this type of operation for the past more than 20 years;

With air cooling in buildings, caissons, containers, or placed in the terminal storage is now in use and/or under development (Canada, the United States, Sweden, FRG, etc.).

The lessons learned in the dry storage of fuel elements from gas-cooled, heavy-water-cooled, or sodium-cooled reactors are being used for the dry storage of spent fuel elements from LWR, as the development concepts show. Of course, the higher specific heat output of fuel elements from LWR must be considered. This is why we will need preceding fading times for fuel elements amounting to between 1 and several years for the dry-storage concepts now being developed. This time span can be achieved easily by storing the fuel elements in the storage basin of the nuclear power plants, especially when we use compact storage there which adequately increases the capacity of the storage basins and thus storage time of the fuel elements.

2.3. Reprocessing of Spent Fuel Elements

We have prior experience covering about 900 t regarding the reprocessing of spent oxidic nuclear fuel from LWR.

In the civilian sector (Great Britain and France) furthermore more than 28,000 t of uranium were processed from other reactor types (for example gas-cooled types) which are more easily handled than fuel from LWR.

The plants in Table 1 for the civilian reprocessing of spent fuel elements from LWR were or are in operation. The plant in Morris (GE, United States), with an annual capacity of 300 t, was not placed in operation in 1971 because of a problematical chemical process. The American AGNS Plant (with a capacity of 1,500 t/hr), which has been ready for operation, is not getting an operating license for domestic political reasons.

The construction of a new plant in Great Britain (with an annual capacity of 1,000-1,200 t of uranium) was suddenly stopped in 1976 for political reasons. In 1978, following a hearing, the possibility for the erection of this reprocessing plant for spent nuclear fuel from LWR was also approved by parliament. Construction is supposed to start during the eighties.

In the Federal State of Hesse, the DWK [German Economic Commission] early in 1980 requested the erection of a reprocessing plant with a capacity of 350 t/yr. The states of Rhineland-Palatinate, Lower Saxony, and Bavaria likewise declared their readiness to accept a construction application. The inquiry commission of the German Lower House on "Future Nuclear Energy Policy" recommends the construction of a noncommercial demonstration plant to test the technology pending the decision on the large-scale industrial introduction of the fast breeder.

The size of the chemical processing systems, which are used in reprocessing plants, does not constitute any major problems for conventional methods. The situation is different when such system components are radioactively contaminated and thus are not easily accessible to manual repairs. This was shown by the Japanese Tokai Mura Plant which had been built with French help and which had to be turned off for about a year at the end of 1978. The cause was a leak in the process acid verification system which could not be repaired for a long time because of the high radiation levels. The German WAK is likewise going to be out of commission probably for a longer period of time after damage in May 1980 on account of difficult repair conditions.

We generally do not have a safety and work safety analysis for the repairability of a reprocessing plant. But here we should have some experiences, for example, from the WAK, in this country, precisely if one considers the experimental character of this facility. Lessons learned with the NFS reprocessing plant in the United States, which in the meantime has been closed down, show that, via ruthenium-106 (half-life about one year), the latter's short-lived daughter product, rhodium-106, essentially contributed to the contamination of the chemical process systems and thus to the radiation exposure of the personnel. This situation points to the storage of fuel elements for several years--at least 10 years--prior to reprocessing.

2.4. Return of Processed Nuclear Fuels

The return of the plutonium and a part of the uranium after reprocessing as nuclear fuel was tested successfully for many years, for example, the FRG, in the VAK nuclear power plants (Grosswelzheim, Karlstein), KRB-A (Gundremmingen) and KWO (Obrigheim). Through such returns one could save a maximum of about 30 percent of the requirements for natural uranium for LWR. The number of return cycles however is possibly limited by the increasing build up of the neutron poisons uranium-236, plutonium-240 and plutonium-242.

The fast breeder would be in a position--by using uranium-238 for the breeding of plutonium--to increase the uranium use compared to the current reactor technology after the buildup of an adequate breeder population by about a factor of 60. The use of the fast breeder thus, in contrast to the use of LWR, is impossible without the reprocessing of spent nuclear fuel.

2.5. Final Treatment of Radioactive Materials

The final treatment of slightly and medium-radioactive waste (for example, placement in concrete or bitumen) has for many years been a part of the state of the art. The same applies to the treatment of highly radioactive solid materials (for example, activated metals).

The vitrification of highly radioactive fission product solutions from reprocessing is only in the testing stage on a laboratory scale in many countries, including the FRG. France, on the other hand, back in 1977-1978 was the first country to place in operation a plant whose capacity would be announced to vitrify the fission product solutions from a reprocessing plant which has a processing rate of several hundred tons of uranium per year. A sintering method is being investigated in Sweden for tieing up fission products.

The separation of radioactive waste gases, which develop during reprocessing, should be tested in the near future. The method to be used here is based on the technique of gas distillation. The isolated gases should be stored temporarily in pressurized gas bottles until the radioactive isotope has decayed. Of course, the required tightness of this container over a storage time of about 100 years is technically a problem until now because the permissible leakage rates are extremely low.

The spent AVR fuel elements are to be enclosed in steel capsules at the rate of 100 units, each. Encapsulation was employed already during the sixties in the United States during terminal storage experiments with fuel elements from an experimental reactor (14). It is being used in the United States likewise during terminal storage experiments in granite using spent fuel elements from LWR. Other methods for the final treatment of spent fuel elements are being developed. For example, the fuel elements are to be cast into metal in Sweden.

2.6. Terminal Storage

Geological formations--which have been opened up in mining terms for this purpose--have been earmarked for the most part worldwide for the terminal storage of radioactive waste.

The resistance of a mine building in terms of time depends on the type of rock and the degree of development. That does not create any special problems for terminal storage facilities because, after waste storage, the remaining empty spaces in the storage chambers and galleries are again filled with rocks so that the convergence of the mine structure will be limited.

A mine can also be so set up that stored radioactive materials can be covered within several decades. One must consider the degree of recoverability here because the stored substances could possibly later on be categorized as raw materials or because--as has been discussed in the United States--a mine might possibly also have to be cleared out again or because storage technologies may have to be tested.

In the FRG and the GDR, the final storage of solid but slightly and medium-radioactive waste is already being accomplished in salt rock. In the FRG, plans likewise call for the terminal storage of highly radioactive substances in this rock. In the Netherlands and the United States, salt deposits are included in the more limited choices for final storage sites. Some countries are also investigating granite or clay for suitability as terminal storage formations (for example, the United States, Canada, Great Britain, Sweden, Belgium, Italy, and France).

Rock salt reveals a high degree of mechanical resistance. This is why strong chambers with a volume of several tens of thousands of cubic meters and caverns with a volume of up to 500,000 m^3 can be made without any further development work. This is the state of the art. In this way, caverns are used on a large-scale industrial basis for the storage of petroleum (Deutsche Shell AG., Deutsche Oil AG., Nordwest Kavernengesellschaft mbH., and others), finished products, liquid gas, and compressed air (gas turbine power plants).

As a function of the pressure and temperature, rock salt is inclined toward creepage and it becomes plastic. If the precise structure of the salt rock is known, then this effect can be calculated because of the laws contained in it.

Moreover, for example, corresponding experiments are being conducted for example in the former German salt mine at Asse II where larger quantities of solid but slightly and medium-radioactive waste have been stored over several years. In the United States, such experiments, which also feature the reciprocal interaction of radioactive radiation with salt, have been advanced very far (for example, 14).

In the GDR, the exploration and erection of a terminal storage facility is urgent for waste disposal purposes because it must be available for the following:

For radioactive operating waste (other than spent fuel elements) from nuclear power plants and possibly for waste from research, medicine, and industry (Asse II is an experimental terminal storage facility and has been closed down indefinitely since 1 January 1979);

For the obligation to take back radioactive waste from the reprocessing of German fuel elements abroad (starting in 1995);

For the possibility of (recoverable) terminal storage of unprocessed fuel elements.

There is reason to worry about the fact that, according to schedules drawn up so far, it should be determined at the earliest by 1993 whether the Gorleben salt dome is at all suitable for the terminal storage of highly radioactive materials (15). Suitability for terminal storage of slightly and medium-radioactive solid materials can be determined somewhat sooner.

The terminal storage of fuel elements from a gas-cooled reactor was planned in the FRG. The Goslar Mining Office on 4 March 1976, on request of the Radiation and Environmental Research Society, approved the storage of spent and encapsulated AVR fuel elements in the Asse II experimental dump. It is not safety reasons which are responsible for the fact that these fuel elements so far have not been delivered for final storage to this experimental terminal storage facility. The reason is the general situation at Asse II. Terminal storage is being discussed as a justifiable waste disposal solution also for the spent fuel elements of the THTR prototype reactor now under construction.

Topics such as criticality safety, heat generation, radiological hazard potential, etc., must be given further consideration for terminal storage facilities but do not seem to constitute a reason for any obstructions according to investigations so far. Work is being done on this in the United States, in Canada, and Sweden and recently also in the FRG (17).

In trouble investigations for salt mines as terminal storage facilities it is important to keep in mind that the mining of potash salts but not the mining of rock salt has so far led to trouble (water penetration) with the subsequent closing of the mines.

Solidified slightly and medium-radioactive materials are already being placed for final storage in the ocean (for example, by the United States, Japan, and some European countries). Japan is moreover investigating the marginal conditions for the terminal storage of solidified, highly radioactive substances. Final storage in the ocean however is very problematical because of the convection of the water and because of the food chain.

Tritium-containing waste water from reprocessing is supposed to be forced into porous, deep geological formations, for example, in the FRG. The method has so far not been tested in this country for radioactive waste water.

3. Evaluation of Waste Disposal Technology

Looking at the dose exposure of operating and maintenance personnel, the process steps in reprocessing and storage and treatment of fission products are considered decisive as compared to those involved in final storage, including final treatment. The same applies to the regional and global environmental exposure from radioactive substances to be evacuated. This is shown by computations concerning the integrated waste disposal concept.

The reprocessing of spent fuel elements furthermore causes a volume enlargement of the radioactive waste. We get the following quantities of radioactive material which must be handled:

Per 1,000 MTU of installed nuclear power plant capacity (LWR) the annual exchange quantity is just about 30 t of spent uranium (as oxide in fuel elements).

Fuel element transport containers used at this time can take fuel elements up to uranium weight of 6 t; in addition there are also smaller transportation containers. On the average, we figure 5 t per container; this means that for every 1,000 MTU we annually need about six shipments of 5 t, each.

Next, 1 t of uranium, when unconditioned, in the form of fuel elements, with structural materials, takes up about 0.5 m^3. When it is conditioned we get just a few cubic meters.

During the reprocessing of 1 t of spent uranium, we get roughly the following quantities of radioactive waste in a form ready for final storage:

Slightly and medium-radioactive waste: 10-20 m^3

Heat-generating, medium-radioactive waste (structural materials, etc.): 2 m^3,

Highly radioactive waste (vitrified fission products): 0.1 m^3.

Furthermore we get about 3 m^3/t uranium in the tritium-containing waste water to be placed in final storage, plus a small gas volume of radioactive gases stored in pressurized gas bottles.

For every 1 t of reprocessed, spent uranium, we get about 0.01 t of plutonium.

To get a realistic picture, these values must in each case be projected for the installed nuclear power plant capacity.

If we investigate the trouble potential of the integrated waste disposal concept, we must say that the overwhelming emphasis rests with reprocessing and storage and treatment of radioactive waste (for example, fission product solutions). Compared to nuclear power plants of present-day design, radioactivity release figures of major scope could of course develop only slowly so that protective measures can be taken.

The INFCE findings show that the radiological long-term risk from spent fuel elements in final storage is not significantly greater than that from highly radioactive waste after reprocessing but that both of them are small compared to natural environmental exposure.

An optimization, for example, of the time duration of fuel element storage with storage time and the quantity of intermediate and final products developing during reprocessing is so far not available for plant safety and work and environmental protection. The comment on the "Fundamental Safety-Engineering Feasibility of the Disposal Center" of the RSK and the SSK of 20 October 1977 does not give us any information on that.

In the context of the present-day waste disposal strategy, consideration is being given to the aspects of fission material flow control overwhelmingly by means of administrative protective measures (for example, surveillance). Possible technical-physical barriers (for example, optimization of isotope composition in spent nuclear fuels of U-233/235 into U-238 or Pu-239/Pu-241 in Pu-240/Pu-242), which would make weapons manufacture practically impossible, has not yet been sufficiently investigated.

Considering the export of nuclear plants however it is necessary to show ways in which proliferation-proof nuclear plants can be designed.

Fission material flow control itself of course is not an argument against final storage of spent fuel elements. Theft by saboteurs can be ruled out both in short-range and in long-range terms and after the terminal storage facility has been sealed, that would be possible only through mining operations with a great expenditure in terms of time and equipment. Building nuclear weapons as part of a government monopoly is based on a corresponding political decision and can be achieved more effectively through uranium enrichment than through the separation of plutonium from the spent nuclear fuels of commercial power reactors, which would be of poor quality for weapons purposes.

In economic feasibility studies, the maximum of 30 percent nuclear fuel, obtained through reprocessing, in case of return into LWR are contrasted against plant costs connected with the parts of the integrated waste disposal concepts tied to reprocessing activities (plants for reprocessing, nuclear fuel processing, parts of waste treatment).

We start with the assumption that the expenditures for plant investments will be fully paid off through depreciation based on the use of the reprocessing of German fuel elements and can therefore, in the context of a cost-benefit analysis, be fully equated to the economic countervalue of the nuclear fuels recovered through the reprocessing effort. This depreciation naturally is only one part of the necessarily arising total cost of reprocessing. The inclusion of the other cost components (for example, operating costs)--which we did not include here to make things simpler--would necessarily further alter the result to the detriment of reprocessing. The saving of separation units for uranium connected with the return of plutonium likewise does not constitute an economic breakthrough.

The decision as to an economical waste disposal concept can be made only after the decision has been made on the large-scale industrial utilization of advanced reactor lines, especially with relation to the fast breeder. The "Future Nuclear Energy Policy" inquiry commission established by the German Lower House is working out the necessary foundations for this. An interim report was submitted in June 1980.

In connection with the use of LWR, we cannot anticipate the reprocessing operation to be economical. This again points up the need for including in our consideration other solutions for waste disposal which at least for the time being will get along without reprocessing.

In terms of time, sticking to the integrated waste disposal concept--which originally was aimed at the considerably faster introduction of breeder technology--could, according to our current level of knowledge and the changes in political will formation, likewise prove to be a bottleneck in energy supply.

This would endanger jobs of persons employed in power plant construction not only in short-range terms but economic growth as a whole could be hindered in longer-range terms. This again would have serious negative effects on the entire situation in the FRG.

4. Conclusion

On the basis of the DGB resolution situation, we must consider three aspects in making a decision as to a waste disposal concept.

1. Minimizing the health risk for employees and environment.

2. Finding a development-policy formula for medium-range and long-range energy supply, weighing real alternatives.

3. Job security for employees currently active in the nuclear industry and in supplier enterprises.

The adequate fulfillment of these aspects can be achieved through the following steps.

A. Brisk handling of applications, licensing, and construction of intermediate storage facilities or initial input storage facilities in waste disposal plants.

B. Drilling and mining exploration to confirm the suitability of a salt dome as final storage site.

C. Bringing about safety-engineering, economic, and political decisions concerning the medium-range and long-range use of fuel cycles and reactor types (for example, HTR, fast breeder).

D. After clearing up points A to C, possibly after the expansion of a waste disposal center consisting of intermediate storage facility or initial storage facility and one terminal storage facility, in each case, through the addition of one process step for the reprocessing of fuel elements.

The terminal storage of radioactive substances and spent fuel elements from LWR, after or without reprocessing, has since March 1980 been the content of the principles for waste disposal measures in nuclear power plants in the FRG (12). Both possibilities are being pursued parallel (parallel approach) and after further development work a selection will be made during the second half of the eighties. The majority resolution of the inquiry commission of the German Lower House on "Future Nuclear Energy Policy" starts with the idea that the parallel approach in waste disposal is technically proper, practical, and politically necessary for the next several years.

This is why it is necessary much more intensively to continue the investigations launched by the federal minister of research and technology concerning the waste disposal alternatives after the submission of the first general report by the Karlsruhe Research Center, Inc. in the summer of 1980.

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FRANCE

PRINCIPLES OF FRENCH NUCLEAR WASTE DISPOSAL

Duesseldorf ATOMWIRTSCHAFT ATOMTECHNIK in German 8 Sep 81 No 8-9, pp 487-492

[Article by A. Gauvenet: "Principles of French Waste Disposal Concept"]

> [Text] The question of reprocessing and the problem of radioactive waste were taken up in France at an early date in the course of nuclear energy development. This was also expressed in the corresponding government regulations according to which there could be no doubt whatsoever as to the principles of reprocessing, plutonium extraction, and the elimination of radioactive waste. In handling radioactive waste, we make a clear distinction between categories with different degrees of radioactivity and half-life. This results in definitions which in turn determine the treatment and the type of storage. Beta and gamma waste is stored, after corresponding pretreatment, if possible at the place where it develops, near the surface, while highly radioactive alpha waste is vitrified and, after preliminary intermediate storage, is then supposed to be placed in deep geological formations. Because intermediate storage is considered guaranteed by the end of this century, France does not feel under pressure of time regarding final storage.

Introduction

The reprocessing problem was tackled in France already under the 1952 five-year plan. At that time, it was decided in France, as had been done shortly before in Great Britain, to reprocess the spent fuel elements from the natural uranium-operated graphite-gas reactors (or Magnox in Great Britain) in order to recover plutonium, a valuable fission material. At that time France as yet did not have any isotope separation plant for uranium enrichment. The British plant was used for military purposes.

The plutonium recovered in this fashion was first of all used for making nuclear weapons. From the very beginning however plans called for a breeder program. It is interesting to note that this 1952 five-year plan was approved at the time of a radical-socialist administration which was firmly convinced as to the significance of the fast breeder.

This plan amounts to F 40 billion (that is, old francs) and calls for the construction of two graphite reactors and the corresponding plutonium extraction plant. This program was clearly aimed at the production of plutonium which was to be used in additional reactors, that is, in power plants and engines ("Le Complexe Atomique" by Bertrand Goldschmidt, p 141).

At that time of course the problem of waste was already being considered. At the Marcoule Plant, fission products were stored in double-wall, rust-proof steel containers (as in Great Britain). Development work for the vitrification of this waste was started at this Marcoule Plant in 1967 by a combined study group from the French AEC and from the St. Gobain firm. Consideration was given to the idea of dumping slightly radioactive waste in the ocean and letting it drift to the bottom. An experiment in this connection had been planned in 1961 in the Mediterranean. This undertaking however immediately ran into heavy resistance so that there was not even an experiment.

At that time already, reprocessing was thus basically determined. The fast breeder program launched in 1957 and the initial prospects for a large-scale nuclear energy program (I would like to recall here the 1957 Euratom brain trust report) confirmed this decision. The certainly noteworthy French uranium deposits were considered inadequate for a large-scale program. The breeder and the attendant plutonium production effort looked like the right kind of backup support for the more distant future.

The reprocessing or nonreprocessing problem again became very timely in the past several years especially under J. Carter's presidential term. Every country addressed itself to this question, especially in the context of the INFCE. I of course need not describe here the conclusions of this investigation which everyone is familiar with. But I would like to remind the reader that, from the viewpoint of nonproliferation of fission materials, the various nuclear fuel cycles, including the interrupted cycle (no reprocessing) were considered equivalent in view of the advantages and disadvantages at that time connected with this in each case.

The long-term problems of waste developing during reprocessing however were recognized even prior to the INFCE. In certain international bodies, this led to an intensive exchange of ideas. I would particularly like to refer to the reports of the NEA Atomic Energy Agency of OECD and here, specifically, the Polvani Report. Although one can certainly say that, from the safety-engineering angle, the nonreprocessed irradiated fuel elements can be stored for a long time under acceptable conditions, we are of the opinion that storage of waste developing from reprocessing offers certain advantages.

This plutonium-free waste contains alpha-radiating radioisotopes which also exist already otherwise in the earth's crust with radioactivities of the same kind and magnitude. This of course rather rough approach no longer applies when all of the plutonium produced in the reactors remains in the "waste." Besides, we must not forget that irradiated fuel elements, stored at great depth, in reality can represent a worthwhile plutonium deposit for third parties. Securing final storage thus becomes a ticklish problem because one can thus not rule out effects coming from third parties or sources.

These considerations confirmed both French experts and experts in numerous other countries, especially in Europe, regarding the attitude they had adopted.

After the determination of this general principle, French policy in this field gradually became more practice-oriented and developed in the manner outlined by me.

General Problem Complex and Legal Regulations

After the principle of reprocessing, of reuse of plutonium and of waste management had been established for many years, it might be interesting to investigate the problem complex first of all from the viewpoint of legal regulations and the attendant technical administrative measures.

The plants for the reprocessing of spent fuel elements, conditioning, and storage of waste since 1963 have been subjected to a very strict licensing procedure. By the way, since that time, the safety and waste organization was gradually established. In 1963, a decree was issued for the main nuclear plants. This decree defines such plants and spells out the corresponding licensing procedure. This decree was slightly amended 10 years later. It must be emphasized that, within the context of this body of rules, the plants for the storage and treatment of waste from the very beginning, as of a certain threshold (which is practically always exceeded), were considered as so-called main nuclear plants and were thus treated with the same strictness as the nuclear reactors or other large plants in the nuclear fuel cycle; that was not always the case in other countries. Indeed, rules and licensing procedures in those countries often were less strict than for nuclear power plants. Besides, the decisions there were often made by a local authority and not by a more or less central agency.

In this connection I would like to recall that, between 1972 and 1980, the SCSIN (the Central Service for Safety in Nuclear Plants, attached to the Industry Ministry) was founded. This central service immediately addressed itself to the waste disposal problem on the basis of the law. Accordingly, an interministerial commission for nuclear safety was established and an Institute for Radiation Protection and Nuclear Safety was founded under the French AEC with reference to rational laws. In 1979, ANDRA--a government Agency for Waste Management--was established.

France has no laws or regulations which require the operator of nuclear plants himself to handle the corresponding waste disposal functions (conditioning and storage of radioactive waste or storage of irradiated fuel elements). Such laws exist in Sweden, in Switzerland, and in the FRG. In Sweden they have a so-called KBS report, that is to say, a safety report for short-term and long-term storage of highly radioactive waste which must be prepared by operators on the basis of pertinent regulations.

In France and in Great Britain most operators of nuclear plants are public institutions, that is to say, in the final analysis, they are the government as such. That of course is expressed in the rules. Agencies responsible for nuclear safety thus have very few conversation partners who could be very easily inspected in operational matters. Because electric power supply is a government operation in France, there is only a single nuclear power plant operation, that is, EDF (French Electric Power Company).

Theoretically, the operators of nuclear plants are not forced to deliver their radioactive waste to ANDRA; although the latter is responsible for long-term waste management, it does not have a monopoly in this field. This is also explained in the light of the above-mentioned reasons; this involves almost exclusively public institutions, apart from certain sectors where only a small waste volume develops (hospitals, laboratories, companies).

In view of the contract relationships existing between the operators and the safety agencies it is clear that one may not store waste at the site itself without official inspection. For the past 17 years, long-term storage has been subjected to very tight regulations and in most cases there is no corresponding disposal area at the particular site itself. This, so to speak, after all does give ANDRA a monopoly position.

These remarks illustrate the flexibility of French regulations leading to a situation where it is sometimes said abroad that France has no atomic law as such. This statement is correct, strictly speaking; in reality all of these regulations constitute a comprehensive collection of texts which have the force of law. This actually boils down to the flexible cooperation of decrees and directives often issued in the context of already existing laws and codes.

This is a characteristic feature of the French system in which new rules and regulations are mostly inserted into the old, already existing framework. This method developed as generally the simplest in the history of French legislation. Each ministerial department or each branch takes care of its own tasks and it does not seem practical to make any fundamental changes here. The combination of all areas of authority in the sector of radiation protection and safety within a single government agency rarely ever led to a final and effective, that is to say, complete result, in those countries where it was attempted. In France we deliberately pursued the opposite route by guaranteeing general coordination and by supplementing or amending existing fields of authority with the help of new laws.

The significance of reprocessing of spent fuel elements and the final storage of radioactive waste in France springs from the large-scale reactor construction program. On the average, about five reactors per year are placed in operation and another five blocks are tied into the grid, year after year, because right now we have a well-balanced construction program.

The problem of treatment and storage of radioactive waste is mainly a technical problem. Looking at it from our viewpoint, the principles described below guarantee satisfactory solutions.

Of course, one must not neglect political and psychological aspects here. The psychologists tell us that the public and perhaps even the engineers dealing with this subject develop negative ideas when confronted with the concept of "waste." I would like to recall that opposition to radioactive waste developed in France very early. I have been dealing directly with the problem complex for about 20 years; this resistance to disposal areas, even experimental storage, began 20 years ago, that is, considerably earlier than the general protest against nuclear energy. We must start with the idea that, as soon as the general criticism of nuclear energy runs out of steam (nuclear energy opponents are becoming somewhat more quiet now and are becoming more diversified), resistance against radioactive waste will continue to grow.

These psychological problems of course, in spite of the already determined technique, do have an effect on the handling of licensing procedures for disposal facilities in terms of meeting deadlines. They can even influence the choice between various options. This problem complex was recognized relatively slowly although this question was taken into consideration already 10 or 12 years earlier; the long-term problem complex however was not correctly understood especially since the nuclear industry was not yet strongly developed. After we became aware of this complex of questions today, we on the other hand are inclined to exaggerate certain problems. Experts do not escape this tendency either. This is why it seems that we must absolutely view the problem of nuclear waste within the correct proportions and we must deal with it in comparison either to natural radiation exposure or to the waste problem connected with conventional energy generation (for example, in the case of coal-fired power plants).

Radioactive Waste Characteristics

Figure 1 shows all plants in which waste develops, from the uranium ore mine via the reactor to the reprocessing plant. Depending upon the specific radioactivity, we distinguish three major waste categories among radioactive waste:

Slightly and medium-radioactive waste, without alpha particles, that is to say, products with a long half-life; the definition "without alpha particles" will be explained later on;

Slightly and medium-radioactive waste with alpha particles;

Highly radioactive waste likewise containing alpha particles,

Here of course we run into problems of delimitation:

Definition of boundary values as of which certain waste is classified in the category of waste containing alpha particles for storage purposes;

Medium-slight radioactive waste with short or medium half-life periods, in case of a combination of radioactivity figures, create the problem of so-called "radiating" waste on account of possible difficulties in handling, transportation, fixing, and conditioning as well as during inspection.

The boundary value problem can also come up in connection with certain beta-radiating and gamma-radiating radioisotopes, not only in connection with alpha particles.

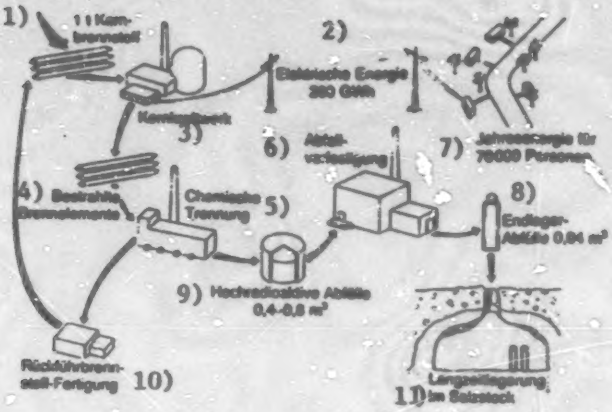
1)
1 l Kern-
brennstoff
2)
Elektrische Energie
200 GWh
Kernkraftwerk
3)
6)
Abfall-
verfestigung
7)
Jahresenergie für
70000 Personen
4) Bestrahlte
Brennelemente
Chemische
Trennung
5)
8)
Endlager-
Abfälle 0,04 m³
9) Hochradioaktive Abfälle
0,4-0,8 m³
Rückführbrenn-
stoff-Fertigung
10)
Langzeitlagerung
11) im Salzstock

Figure 1. Fuel cycle. Key: 1--1 liter [illegible in photostat] nuclear fuel; 2--Electric energy, 200 GWh; 3--Nuclear power plant; 4--Irradiated fuel elements; 5--Chemical separation; 6--Waste consolidation; 7--Annual energy for 70,000 persons; 8--Final waste storage, 0.04 m^3; 9--Highly radioactive waste, 0.4-0.8 m^3; 10--Production of recovered fuel; 11--Long-term storage in salt dome.

Principles of Waste Management in France

These principles do not essentially differ from those which are applied also in other countries; but we must stress some features which spring from French policy.

Storage Preparation

The developing waste must first of all be sorted. The first prerequisite for correct waste disposal is good sorting and, if necessary, recycling of alpha particles, a volume reduction (basically), waste treatment, and finally conditioning, that is to say, binding up the waste and putting it in suitable containers. It goes without saying that all operations must be checked [monitored].

The first several operations are mostly accomplished at the place where the waste develops. The last steps (making the waste bundles, filling the containers) take place at the storage site or in a specially designated plant. To the extent that they are not so processed (such as, for example, sludge), all waste products are assembled in firm bundles.

For sorting purposes, the waste categories must be defined as acurately as possible and it is necessary in particular to provide clear information as to the boundary value below which a waste product is to be considered "not radioactive" or as of what value it is to be considered "radioactive."

For sorting purposes one must of course have the corresponding recording and monitoring instruments which presently are not really always suitable but which are continually being improved.

Storage

There are of course well-known cases in which the storage problem was solved and there are other cases where it has not yet been solved. It is the goal of final disposal to store the waste but the manner of storage can vary depending upon the type of waste. In each case, we want final storage but this way often leads via necessary intermediate storage.

Figure 2 illustrates the particular storage possibilities in the light of the categorization made. The beta and gamma waste is stored at the surface, whereby transportation and storage may create problems depending upon whether the waste product is radioactive or not.

For waste products containing alpha particles, deep storage is provided, as in the case of vitrified waste, whereby the depth will depend on the particular radioactivity level.

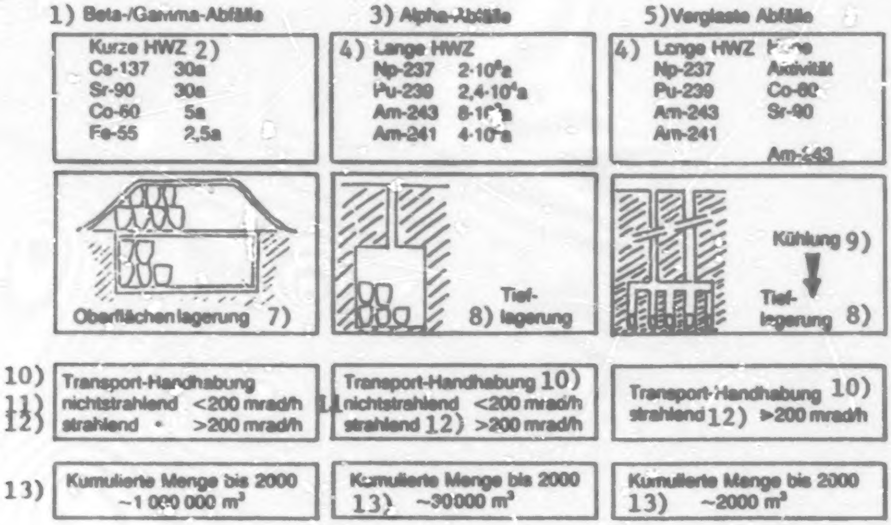
1) Beta-/Gamma-Abfälle
3) Alpha-Abfälle
5) Verglaste Abfälle
Kurze HWZ 2)
Cs-137 30a
Sr-90 30a
Co-60 5a
Fe-55 2,5a
4) Lange HWZ
Np-237 $2 \cdot 10^{6}$a
Pu-239 $2{,}4 \cdot 10^{4}$a
Am-243 $8 \cdot 10^{3}$a
Am-241 $4 \cdot 10^{2}$a
4) Lange HWZ
Np-237
Pu-239
Am-243
Am-241
Hohe Aktivität
Co-60
Sr-90
Am-243
Oberflächenlagerung 7)
Tieflagerung 8)
Kühlung 9)
Tieflagerung 8)
10) Transport-Handhabung
11) nichtstrahlend <200 mrad/h
12) strahlend >200 mrad/h
Transport-Handhabung 10)
11 nichtstrahlend <200 mrad/h
strahlend 12) >200 mrad/h
Transport-Handhabung 10)
strahlend 12) >200 mrad/h
13) Kumulierte Menge bis 2000 ~1 000 000 m³
Kumulierte Menge bis 2000 13) ~30000 m³
Kumulierte Menge bis 2000 13) ~2000 m³

Figure 12. Classification of radioactive waste. Key: 1--Beta and gamma waste; 2--Short half-life; 3--Alpha waste; 4--Long half-life; 5--Vitrified waste; 6--High radioactivity; 7--Surface storage; 8--Deep storage; 9--Refrigeration; 10--Transportation and handling; 11--Nonradioactive; 12--Radioactive; 13--Cumulative quantity up to 2000.

1st Waste Category: Beta and Gamma Waste Products without Alpha Particles

What do we mean by "no alpha particles" in view of the principles of our disposal policy and considering the anticipated dumps and the particular storage capacity for beta and gamma waste and alpha waste?

The deposit gets waste products which for the most part are of the beta and gamma type with a half-life of at most 30 years. After the period of operation, which is followed by a surveillance period of 200-300 years, this deposit is thus to be "defused" again (in other words, complete release). The alpha radioactivity level in this deposit must not prevent this "defusing." A corresponding investigation thus is being conducted for each storage facility and from one case to the next so that one can undertake unrestricted defusing. This means that, after defusing, or after release, earth work can be done with a bulldozer at the site for the construction of apartments or a road. The products on the surface are thus released in the form of aerosols. There must likewise be no major exposure of the population via water. In a particular case study we seek to find out as of what boundary value a waste product must be considered as containing alpha particles; if we are below this boundary value, we may assume that there are no alpha particles in the waste products.

For these beta and gamma radioisotopes we presently have the first final storage facility. This is the storage facility directly next to the French reprocessing plant in the northwestern part of Normandy at Cap de la Hague (on the English Channel).

Waste products are stored there on the surface or at shallow depths. The content of the blocks or barrels as well as the waste bundles and their containers are governed by clear specifications which were approved by the appropriate authorities. The content of alpha products depends also to a minor degree on the type of fixation.

France plans to establish a second storage facility in Forez in the center of the country. First of all we want to use the strip-mining area of this former uranium ore mine which has been operated by Cogema [General Nuclear Materials Company]. This former strip mine in the meantime has run out. A corresponding licensing procedure was launched. The second phase according to plan is to store the waste also in tunnels, provided the investigations yield a positive result.

For the first case (storage in quarry) we are currently examining the safety report. This almost complete investigation is to enable us to determine the maximum permissible alpha value; the same applies to the next phase. For the next phase we have the previously mentioned two possibilities which however turn out to be different than for storage on the surface. The water problem remains more or less the same; but at a depth of more than 50 meters we no longer run into the problem of aerosol formation resulting from earth work at the surface. In this case, in other words, on suggestion of ANDRA, the authorities responsible for safety can determine a different value for alpha particles.

In handling this first category, we have intermediate storage functions at the site where the waste product develops, prior to final storage, that is. This may involve simple intermediate storage prior to transportation to the final storage facility or it may involve systematic intermediate fading storage. If we have a waste product with a short half-life, then it may make sense to wait for a major fading of radioactivity in order to reduce the possible radiation exposure of operating personnel. The capacity of this deposit facility will be explained in a different article in this issue (J. M. Lavie, "The Long-Term Industrial Management of Radioactive Wastes in France" p 493).

The problems currently being worked on for example involve the determination of standards for each storage facility, the norms for fixing the waste products, and the drafting of handbooks on process-engineering. Certain problems have already been solved and others are currently still being studied.

2nd Waste Category: Slightly and Medium-Radioactive Waste Products with Alpha Particles

This involves a variable category which depends on the boundary value which, in turn, is related to the site. The values however do not fluctuate significantly. It must be kept in mind that the 30,000 m^3 or 70,000 m^3, which will develop by the year 2000 and which are shown in Figure 2, represent waste with a specific radioactivity which comes very close to the boundary values, as we consider them in actual practice.

In other words, depending upon whether a boundary value is raised for a favorable storage facility or whether it is reduced for a less favorable storage facility, one can store more or less of those slightly and medium-radioactive waste products containing alpha particles. As we said before, this boundary value also depends on the type of fixation, which gives us additional flexibility. In the specific case of radioactive waste, conditioning may create problems because it is not as easy to fix radioactive waste as nonradioactive waste; the same also applies accordingly to transportation.

In the meantime the techniques involved have become known. They are being further developed with every passing day. The bottleneck is not to be found in the engineering phase but in the choice of the storage facilities. We still do not have any final storage facilities for such waste. At this time, all waste is being stored temporarily in the plants where it develops. French policy is to set up a series of such preliminary storage facilities; we pick the storage facilities with the best possibilities in order, so to speak, to "consolidate" intermediate storage. The transition time is limited; it is about 20 years.

The first final storage facility in France thus could represent the second phase of the deposit facility in Forez; this so far is only a preliminary project; the necessary licensing procedures have not yet been started. This would involve storage at a depth of several tens of meters.

Investigations must still show us whether the boundary value for alpha particles can be set higher than for storage on the surface; this of course would give us greater storage possibilities. But it is likely that, regardless of the level of the boundary value, an additional storage facility must be set up for capacity reasons alone. The corresponding preliminary steps must be started right away.

3rd Waste Category: Highly Radioactive Waste Products

The figure of 2,000 m^3 by the year 2000 here is no big volume. It was decided in France to vitrify this waste. In other countries, such a decision has so far not been made. The experts sometimes prefer to wait and see whether a better method might not be developed. All considerations so far however show that vitrification is one of the best if not the best method currently under consideration. Vitrified waste products currently are subjected to intermediate storage, on the spot, in the Marcoule Nuclear Research Center. The same plans have also been made for the French reprocessing plant at La Hague where a vitrification plant is likewise being planned. This intermediate storage takes place under extremely safe conditions whereby the vitrified waste is cooled and the surface areas needed are not very large. The final solution is currently being checked out regarding several options; at this point we only want to mention the two main options.

Waste can be stored temporarily in the place where it develops until the beta and gamma particles have faded sufficiently. Beta and gamma radioactivity indeed represents problems in connection with final storage because the temperatures generated in the glass block can have an effect on the environment although this was not the case in the other waste products. This fading time resulting from cooling would extend over several tens of years. But this fading can also take place in the final storage facility, assuming that the waste products are being cooled for an adequately long period of time.

For these final storage facilities, we must consider depths of something like 500-1,000 m. That was the subject of the Swedish "KBS" safety report which supplied a valuable contribution in this field. This report very credibly stated that such final storage can take place at greater depths so that no noteworthy effects should result for the environment and especially for the population also in longer-range terms.

At this point we might recall once again that--as in the nuclear field in general--safety is based on a series of barriers which are erected between radioactivity and the environment (in other words, human beings). These artificial barriers (glass and tanks) have a limited lifetime which is taken into consideration from the very beginning. The geological barriers however can be guaranteed to function over a very long period of time. This on the one hand involves the material which is dumped around the containers and, on the other hand, the geological formations themselves, as well as the effect of the depth. Finally, a slow and controlled spread of these products, without any noteworthy effects on the environment, is connected with this very long-term storage.

One known feature of radioactive products with a long half-life is represented by the fact that the specific radioactivity is slight because this involves, more or less, the atomic weight of radium or plutonium. This activity is inversely proportional to the half-life. For this reason, if safety conditions are maintained, there are final solutions even in very long-range terms. This feature however is little known to the public. After the fading of the beta and gamma particles, the residual alpha radioactivity is on the same order of magnitude as the natural radioactivity which we find in the earth's crust.

After the few hundred years, which correspond to this essential fading of the beta and gamma particles, we are thus in the range of alpha radioactivities which exist already in the natural state in the earth's crust. This is to be a measure for the evaluation of the real problem.

The application of these principles takes place in several stages and there is of course no reason to be hasty in this field. On the contrary, it is desirable to use the new discoveries of science and technology which will inevitably come up in the future.

On the other hand it is however essential even now to have complete documentation, including records and safety criteria on reference solutions; in France this consists of storage in a deep granite formation.

The following are required for these records and documents.

1. Fundamental investigations, among other things, involving drillings down to a depth of 1,000 m and the analysis of the rock formations encountered. A first drilling operation of this kind was performed in 1980. The corresponding investigations are currently being completed. At the same time we are conducting an economic-technical investigation in order to make a choice among the previously mentioned cooling processes for the glass blocks.

2. Long storage to prove feasibility; this could be done only within a period of 10 years.

3. Search for suitable sites which would follow the first two phases and which, after evaluation, would lead to the choice of a final storage site and to the start of the corresponding licensing procedures. There is nothing to prevent us from using at this time the results achieved in the meantime from the investigations conducted parallel within the context of international cooperation regarding other rock formations, that is, other than granite (slate, salt domes, clay) or regarding storage on the ocean bottom. Actinide separation is also being investigated in our research centers.

Some Remarks on the Principles Just Discussed

Calculation of Economy

The total costs of waste management must be considered at all times. If we calculate only partial aspects, we run the risk of failing to launch the necessary steps because they seem to be unnecessarily expensive. This overview of the cost aspect for the entire waste cycle is very essential.

In the past, we did not always have this complete overview and this is why the economic study was inadequate. On the other hand, it is obvious that we do not know everything even now and that certain approximations must be undertaken. But it seems important to do this right now because a method, which may seem to be not worthwhile at this time, can become important if one considers the total expenditure, including the anticipated costs for intermediate and final storage. The recycling of alpha products which I mentioned earlier and the combustion problems sometimes come under the so-called category of "economically incomplete."

Financing

In long-term financing we are dealing roughly with a leasing system for which we must know whether we want to capitalize in that we put the money up right away or whether we want to have a distribution or carryover system. In France, we decided on the distribution system, that is to say, we do not put all out money in one basket with all of the attendant uncertainties; instead, the money which we somehow get, which comes from the nuclear industry or from the government, to the extent that this involves research, is used during the year in which it is paid out. This is how we are tackling the long-term problems.

Waste Problem Complex

In looking at all of the problems involved in waste treatment in the broadest sense, we must take care to make sure that we are not going to have any so-called "breeding" of waste gas and waste water. It is quite conceivable that a method might look very attractive but that one did not figure on all of the waste gas and waste water that might result from it. If, for example, we solve the problem of solid waste in an optimum fashion, there is a danger that waste water might develop in a by no means negligible fashion so that the particular method would no longer offer any advantages.

It is furthermore very important to examine the problem complex of waste according to the principle of risk-utility investigations, such as this is recommended officially by many bodies and especially by the ICRP. This is often very important for the choice of methods if in particular, for a certain waste treatment method, we compare the radiation exposure of the population to the radiation exposure of the plant personnel or if one adds both of them up together. This sum should be kept as small as possible and that naturally is not without significance in the choice of the method.

Sector Coordination

I would now like to come back to fixation and conditioning. We want the same thing as do other managers, that is to say, we want the kind of standardization which will lead to the drafting of method handbooks and we want this within a context established by the safety authorities. That naturally depends on the storage operation as such and this is why the waste treatment and waste storage sectors must be coordinated with each other. This is very important because a part of the barriers (generally, one or two barriers) is made prior to storage, that is to say, during fixation and treatment. As I said before, it is thus very important to make sure that we harmonize everything with medium-range waste management.

Quite generally speaking I would like once again to underscore the tremendous reciprocal dependence of the individual sectors. It is quite clear that, in the waste management sector, research and industrialization cannot be developed further independently of each other. We must have good coordination here.

Conclusion

In conclusion I would like once again to stress two or three of the points mentioned above.

1. For the waste problem complex we presently do not yet have any complete solution; technically we have advanced very far; the big difficulties are primarily of a political and psychological nature.

This statement coincides not only with the conclusion of the OECD but also with that of the American DOE. In a DOE report published recently on the international situation in the waste field, this point is particularly underscored.

Regarding the studies, we can define two categories:

The effectiveness of "internal artificial barriers" is of the utmost importance in terms of safety engineering because safety for a certain period of time mainly is based on the quality of these artificial barriers.

That explains the importance of these studies and the preparation of corresponding process-engineering handbooks. The French AEC has an engineering bureau which is available for everybody for this purpose.

Regarding the external artificial barriers, around the steel casings, containing the glass blocks, we are of the opinion that valuable materials (for example, titanium) or simply only useful materials (such as, for example, copper) should not be used because we otherwise would be turning the storage facility into an attractive metal mine (which would be the case for plutonium if we did not reprocess it).

Numerous studies must be continued regarding storage. We have a study program with accompanying experiments designed to help us find final solutions for highly radioactive waste. But the biggest problem is, as we said before, of a psychological and political nature. The previously mentioned studies contemplate not only so-called geological storage but also other storage possibilities, for example, dropping on the ocean bottom. Several years ago, France used the method of dropping waste into the ocean for slightly radioactive waste. This solution is excellent and, from the viewpoint of radiation exposure, in certain cases produces better results than storage on the surface.

In addition to these general studies, we of course also are looking into the matter of site location.

By the way, we must also mention the currently very active and fruitful international efforts in this field, especially in the context of the IAEO, EURATOM, and the OECD via NEA.

3. Finally I would like to emphasize that, in the field of radioactive waste, we need properly understood pragmatism. We frequently assign too much significance to rational and often excessive formalist thinking, as against [practical] testing. In my opinion, with pragmatism we can much better count the objections raised by the public than with a priori strictly rational thinking. Earlier we mentioned the problem of boundary values for alpha particles. Certainly, there are two waste categories with slight and medium radioactivity. But we may start with the idea that one can very convincingly illustrate this moving dividing line between the two categories if one clearly points up the problem of these boundary values and if one relates that to the particular site.

Author's address: A. Gauvenet, Directeur Central de la Protection et de la Surete, CEA, 31-33, rue de la Federation. F-75752 Paris, CEDEX 15. Revised version of

overview lecture delivered to the annual conference on nuclear technology of the German atomic forum and the Nuclear Engineering Society, held in Duesseldorf on 24-26 March 1981.

5058
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FUTURE OF GARIGLIANO POWER PLANT DISCUSSED

Naples IL MATTINO in Italian 15 Sep 81 p 15

[Article by Michele De Simone: "Is There Another Powerplant?"]

[Text] Sessa Aurunca--The geography of the new electric powerplants, provided for by the national energy plan, recently submitted by the new minister of Industry, Marcora, has brought up again the current interest of the problem of the Garigliano nucleoelectric powerplant, at a standstill for the last 3 years in a sea of controversial discussions and uncertainties. It is evinced from the report by the head of the ministry most involved on the "energy" front, in fact, that "a 1,000-megawatt nuclear unit has been scheduled for the Campania region, on the last stretch of the Garigliano River." In view of the fact that there is already another powerplant "on the last stretch of the Garigliano River," although deactivated, either this plant will be developed to attain the scheduled power of 1,000 megawatts, or another one will be built in the vicinity, the famous "Garigliano-A" talked about some time ago.

This hypothesis is supported by a decision by the Board of Directors of ENEL [National Electric Power Agency] in a meeting held in Rome in the first 10 days of July, only apparently in conflict with the provisions of the energy plan. At that time, the board is said to have decided to shut down the Senn, "unloading" the reactor. The decision by the top decision-making body of ENEL would put an end to controversial discussions on the advisability or timeliness of putting the obsolete plant back in operation, but it opens up other discussions concerning its future use.

And coupled with this point is the hypothesis of the national energy plan, which provides for a 1,000-megawatt powerplant on the last stretch of the Garigliano and which, in the light of the facts known and capable of being interpreted at the present time, means establishment of the new plant on the site of the old one or in the vicinity. In other words, "nuclear" presence remains on the plain of the Garigliano.

At first, when the rumor leaked out that the ENEL technicians were convinced that the drain of billions into the bottomless pit by the Senn "crock" had become unproductive, the hypothesis of a "reconversion" into a storage place for radioactive wastes was frankly feared. A worst case undoubtedly, although, at this point, it is not understood whether the "worst" case actually was the number of assumptions under consideration, all rich in question marks. At any rate, the following is the most reliable one: namely, construction of a new powerplant, precisely with a power of 1,000 megawatts, possibly coupled with the structure of the old one. In fact, the procedure that should be incorporated--unless there are sensational modifications--is based on deactivation of the reactor in whose cells there are 208 fuel elements, still "active," and a partial improvement of the plant by insulating the large cement sphere, which also contains the primary circuit. In this way, the turboalternator set, appropriate both for nuclear systems as well as for other systems, could be used at any rate. In this connection, it seems that ENEL has ordered a study to be made by Ansaldo for this purpose. In practice, both plants would be connected by auxiliary functions.

Establishment of a new powerplant would put off into the future the problems raised by dismantling the old powerplant in terms of "decontamination," in view of the fact that science has not yet solved the issue of "reclamation" of nuclearized areas.

From the technical point of view, once the 208 fuel rods are withdrawn from the reactor cells, the primary circuit--the one in which a gas leak occurred in July 1979--should be restored, in order to have water circulate in it to perform an initial decontamination process.

Another problem connected with deactivation of the "General Electric" reactor is storage of the fuel elements in the adjacent collection pool, from which the spent rods should be removed as soon as possible. They are usually sent to the Saluggia collection center in Piedmont.

As will be recalled, last June the minister of Industry, Pandolfi, scheduled a meeting in Caserta to discuss and clarify nuclear problems on a national and local level, precisely at the peak of the controversial discussions also brought about on occasion of a joint communal council meeting, held in Cellole, of centers between Casertano and Lower Latium (Sessa Aurunca, Cellole, Mondragone, Castelforte, San Cosma and San Damiano, Minturno) interested in bringing a civil suit against ENEL for possible harm to the residents.

It is obvious that today, more than yesterday, especially as a result of the news coming out officially from the national energy plan and from the ENEL decisions, a meeting with the government representative, in this particular case, Minister Marcora, is gaining still more current interest, in order to learn what the "atomic" future of Terra di Lavoro [Caserta Province] will be.

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28 October 1981

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 120

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28 October 1981

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 120

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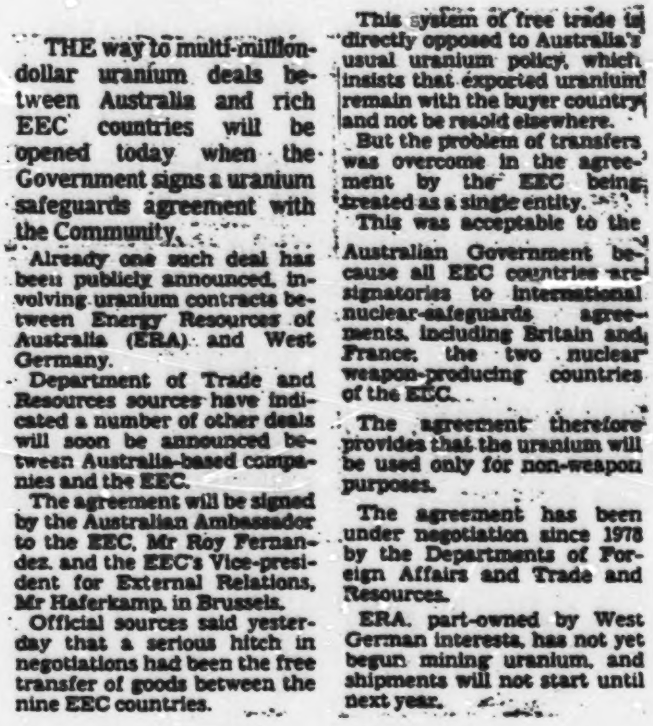
Safeguards Accord

Canberra THE AUSTRALIAN in English 21 Sep 81 p 13

[Article by Laura Veltman]

[Text]



THE way to multi-million-dollar uranium deals between Australia and rich EEC countries will be opened today when the Government signs a uranium safeguards agreement with the Community.

Already one such deal has been publicly announced, involving uranium contracts between Energy Resources of Australia (ERA) and West Germany.

Department of Trade and Resources sources have indicated a number of other deals will soon be announced between Australia-based companies and the EEC.

The agreement will be signed by the Australian Ambassador to the EEC, Mr Roy Fernandez, and the EEC's Vice-president for External Relations, Mr Haferkamp, in Brussels.

Official sources said yesterday that a serious hitch in negotiations had been the free transfer of goods between the nine EEC countries.

This system of free trade is directly opposed to Australia's usual uranium policy, which insists that exported uranium remain with the buyer country and not be resold elsewhere.

But the problem of transfers was overcome in the agreement by the EEC being treated as a single entity.

This was acceptable to the Australian Government because all EEC countries are signatories to international nuclear-safeguards agreements, including Britain and France, the two nuclear weapon-producing countries of the EEC.

The agreement therefore provides that the uranium will be used only for non-weapon purposes.

The agreement has been under negotiation since 1978 by the Departments of Foreign Affairs and Trade and Resources.

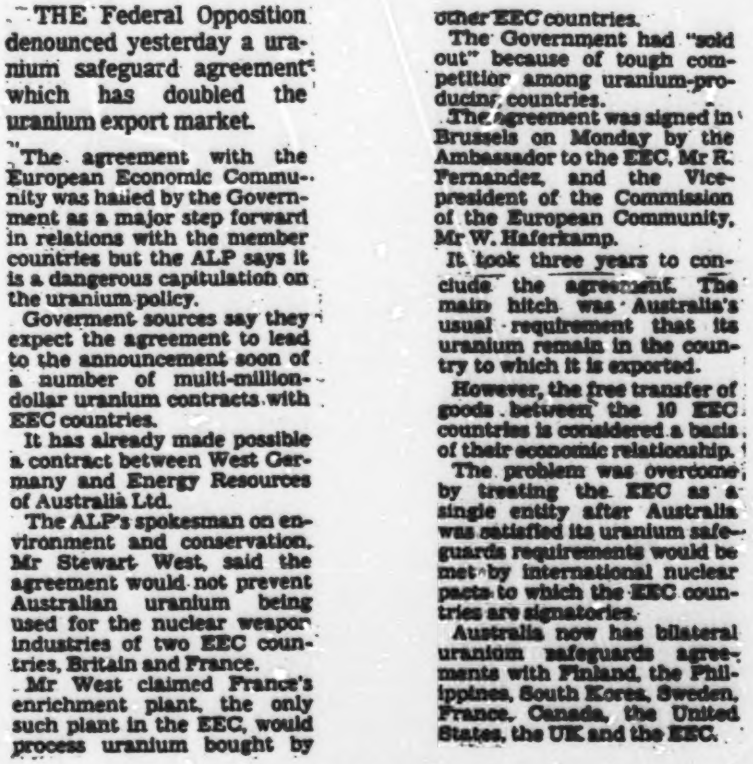
ERA, part-owned by West German interests, has not yet begun mining uranium, and shipments will not start until next year.

ALP Opposition to Pact

Canberra THE AUSTRALIAN in English 23 Sep 81 p 2

[Article by Laura Veltman]

[Text]



THE Federal Opposition denounced yesterday a uranium safeguard agreement which has doubled the uranium export market.

The agreement with the European Economic Community was hailed by the Government as a major step forward in relations with the member countries but the ALP says it is a dangerous capitulation on the uranium policy.

Goverment sources say they expect the agreement to lead to the announcement soon of a number of multi-million-dollar uranium contracts with EEC countries.

It has already made possible a contract between West Germany and Energy Resources of Australia Ltd.

The ALP's spokesman on environment and conservation, Mr Stewart West, said the agreement would not prevent Australian uranium being used for the nuclear weapon industries of two EEC countries, Britain and France.

Mr West claimed France's enrichment plant, the only such plant in the EEC, would process uranium bought by other EEC countries.

The Government had "sold out" because of tough competition among uranium-producing countries.

The agreement was signed in Brussels on Monday by the Ambassador to the EEC, Mr R. Fernandez, and the Vice-president of the Commission of the European Community, Mr W. Haferkamp.

It took three years to conclude the agreement. The main hitch was Australia's usual requirement that its uranium remain in the country to which it is exported.

However, the free transfer of goods between the 10 EEC countries is considered a basis of their economic relationship.

The problem was overcome by treating the EEC as a single entity after Australia was satisfied its uranium safeguards requirements would be met by international nuclear pacts to which the EEC countries are signatories.

Australia now has bilateral uranium safeguards agreements with Finland, the Philippines, South Korea, Sweden, France, Canada, the United States, the UK and the EEC.

CSO: 5100/7503

AUSTRALIAN URANIUM NOW 17 PERCENT OF WEST'S KNOWN RESERVES

Canberra THE WEEKEND AUSTRALIAN in English 26-27 Sep 81 p 29

[Text]

AUSTRALIA'S nuclear industry now has more of the world's uranium reserves than it did last year, according to the latest figures.

The Australian Atomic Energy Commission announced yesterday that Australia's uranium resources now represented 17 per cent of the West's known reserves.

Australian mines can economically recover a total of about 294,000 tonnes of uranium, worth about $80 a kilogram, which is a drop of 5000 tonnes on the commission's 1980 figures.

The commission accounts for this drop by saying the cost of uranium mining and processing has risen, making some deposits which were previously regarded as economic propositions now too expensive.

It also said about 2000 tonnes of uranium was mined and processed by the industry last year.

But reserves of uranium which can be mined at higher prices have increased as more discoveries are made.

Uranium recoverable at between $80 and $130 a kilogram now totals 23,000 tonnes.

The commission figures show that the world's known recoverable reserves of $80 a kilogram uranium fell by 7 per cent in the past year.

Reserves in the US fell 37 per cent.

The commission said the US must now be considered a potential customer for cheap Australian nuclear fuel.

American industry now has 134,000 tonnes less uranium which can be mined and milled at economic prices.

The commission also estimates there are additional reserves of cheap uranium in Australia.

Its figure for these "estimated additional resources" has jumped 58,000 tonnes to a total of 264,000 tonnes.

Australia, Canada and the US share most of the Western world's uranium reserves.

Mining experts say that Australia's uranium can be mined within today's cost ranges and using proven mining and processing technology.

Australia's nuclear industry came under strong criticism last month by the ACTU, which claimed it was "headed for economic catastrophe".

The trade union body singled out the Atomic Energy Commission for criticism because the nuclear body advocated the construction of a uranium enrichment plant in Australia.

But the latest figures, with their adjustment of world uranium reserves, casts doubt on the ACTU's predictions of a collapse in the Australian nuclear industry.

"We can expect the big investors to move on in good time, or appeal for help to their sympathetic friends in government," the ACTU said in its criticism of the industry.

"But meanwhile workers will have uprooted themselves and their families to travel to remote locations with dangerous working conditions, with the prospect of early sackings as the contracts fail to materialise, causing the mines to cut down their output or close down altogether."

The suggestion that falling prices would make it difficult for Australian uranium to compete on an international buyers' market does not take in to account the likely rise in the cost of mining and processing in other countries, which could make local deposits attractive investments.

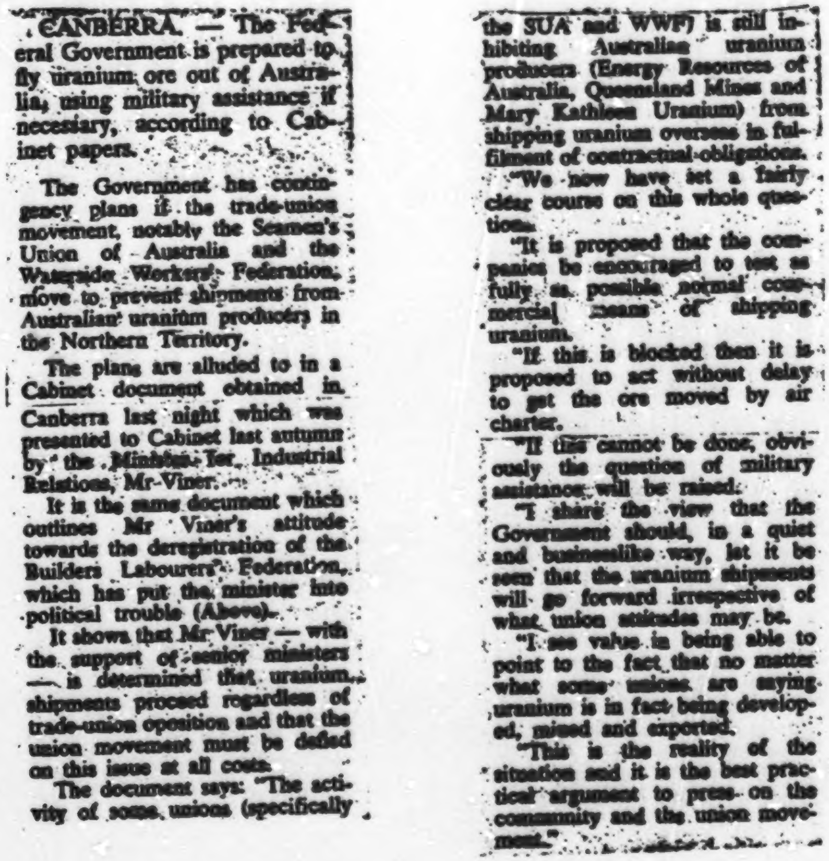
CSO: 5100/7503

GOVERNMENT WILL FLY OUT URANIUM TO BYPASS UNION BOYCOTTS

Sydney THE SYDNEY MORNING HERALD in English 23 Sep 81 p 1

[Article by Paul Kelly]

[Text]



CANBERRA. — The Federal Government is prepared to fly uranium ore out of Australia, using military assistance if necessiary, according to Cabinet papers.

The Government has contingency plans if the trade-union movement, notably the Seamen's Union of Australia and the Waterside Workers' Federation, move to prevent shipments from Australian uranium producers in the Northern Territory.

The plans are alluded to in a Cabinet document obtained in Canberra last night which was presented to Cabinet last autumn by the Minister for Industrial Relations, Mr Viner.

It is the same document which outlines Mr Viner's attitude towards the deregistration of the Builders Labourers' Federation, which has put the minister into political trouble (Above).

It shows that Mr Viner — with the support of senior ministers — is determined that uranium shipments proceed regardless of trade-union oposition and that the union movement must be defied on this issue at all costs.

The document says: "The activity of some unions (specifically the SUA and WWF) is still inhibiting Australian uranium producers (Energy Resources of Australia, Queensland Mines and Mary Kathleen Uranium) from shipping uranium overseas in fulfilment of contractual obligations.

"We now have set a fairly clear course on this whole question.

"It is proposed that the companies be encouraged to test as fully as possible normal commercial means of shipping uranium.

"If this is blocked then it is proposed to act without delay to get the ore moved by air charter.

"If this cannot be done, obviously the question of military assistance will be raised.

"I share the view that the Government should, in a quiet and businesslike way, let it be seen that the uranium shipments will go forward irrespective of what union attitudes may be.

"I see value in being able to point to the fact that no matter what some unions are saying uranium is in fact being developed, mined and exported.

"This is the reality of the situation and it is the best practical argument to press on the community and the union movement."

CSO: 5100/7503

GOVERNMENT PROBING RADIATION FROM FRENCH ATOLL NUCLEAR TESTS

Canberra THE WEEKEND AUSTRALIAN in English 26-27 Sep 81 p 4

[Article by Wio Joustra]

[Text]

THE Federal Government is making urgent inquiries into allegations that French nuclear tests have caused serious radiation leaks in Pacific waters for several years.

But the Prime Minister, Mr Fraser, yesterday ruled out any early action against France, because of a lack of information. He said that in the absence of information it would be premature to canvass courses of action.

Mr Fraser was replying to an attack on France's underground nuclear tests at Mururoa Atoll, made in Parliament by the Opposition spokesman on foreign affairs, Mr Bowen.

Mr Bowen asked whether the Government was aware that as a result of recent atomic tests it was not safe for people to swim in surrounding waters.

He said there had been reports that a 30-60cm crack had been opened by the nuclear blasts along an 800m stretch of the atoll below sea level. The reports indicated serious leaks of radioactivity had been occurring in the waters of the Pacific for several years.

Mr Bowen said this gave Australia strong grounds to again successfully institute action against France in the International Court of Justice at The Hague.

In his reply, Mr Fraser said the Government was aware that on August 12, the authorities in French Polynesia issued a communique declaring the beach in the eastern part of Mururoa Atoll temporarily closed.

The reason given was the possibility that "residues of the atmospheric tests conducted prior to 1975" might have been deposited there after a period of bad weather.

The communique said "the temporary situation that has been created is a result of atmospheric testing and had no link with the underground testing that has been carried out since 1975".

Mr Fraser said: "The Government has no information concerning any serious leaks of radioactivity in the waters of Mururoa Atoll.

"Nor does it have information which supports the suggestion that, due to venting, a large gap has been opened in the atoll below sea level."

But he said that in the light of Mr Bowen's information the Government was making urgent inquiries.

Australia's continued opposition to the French nuclear testing program was firmly on record with the French Government.

These views had been conveyed to France frequently, most recently in discussions in Paris in June between the Minister for Foreign Affairs, Mr Street, and the French Foreign Minister, Mr Cheysson.

Australia also supported the resolution adopted by the recent meeting of the South Pacific Forum in Vanuatu.

This reaffirmed the forum's strong condemnation of nuclear weapons testing and urged France immediately to cease its program and provide full details of the effects of past testing activities on Pacific people and the environment.

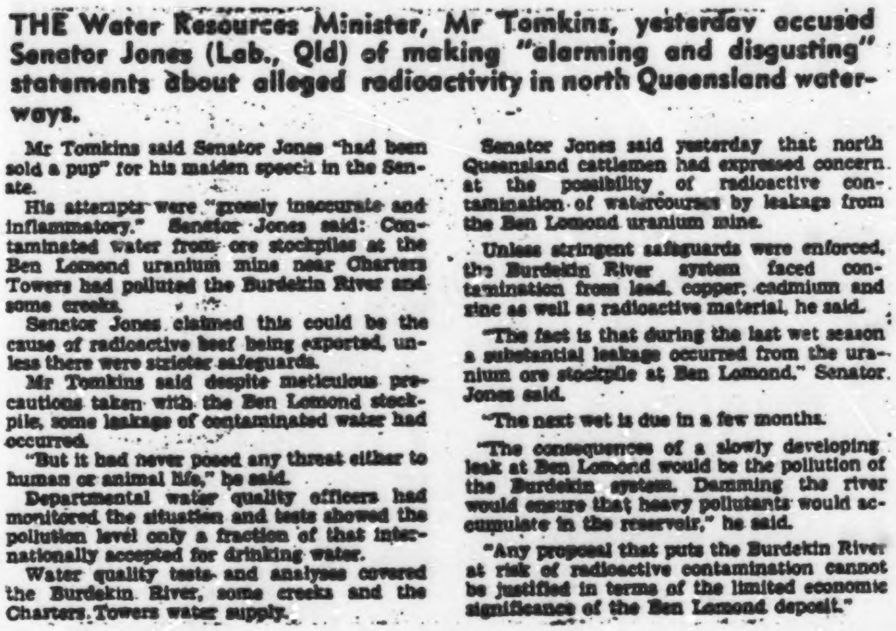
The issue is almost certain to be raised by Pacific members at next week's Commonwealth Heads of Government Meeting in Melbourne.

CSO: 5100/7503

BEEF NOT AFFECTED BY RADIOACTIVE WATER FROM BEN LOMOND

Brisbane THE COURIER-MAIL in English 22 Sep 81 p 11

[Text]



THE Water Resources Minister, Mr Tomkins, yesterday accused Senator Jones (Lab., Qld) of making "alarming and disgusting" statements about alleged radioactivity in north Queensland waterways.

Mr Tomkins said Senator Jones "had been sold a pup" for his maiden speech in the Senate.

His attempts were "grossly inaccurate and inflammatory." Senator Jones said: Contaminated water from ore stockpiles at the Ben Lomond uranium mine near Charters Towers had polluted the Burdekin River and some creeks.

Senator Jones claimed this could be the cause of radioactive beef being exported, unless there were stricter safeguards.

Mr Tomkins said despite meticulous precautions taken with the Ben Lomond stockpile, some leakage of contaminated water had occurred.

"But it had never posed any threat either to human or animal life," he said.

Departmental water quality officers had monitored the situation and tests showed the pollution level only a fraction of that internationally accepted for drinking water.

Water quality tests and analyses covered the Burdekin River, some creeks and the Charters Towers water supply.

Senator Jones said yesterday that north Queensland cattlemen had expressed concern at the possibility of radioactive contamination of watercourses by leakage from the Ben Lomond uranium mine.

Unless stringent safeguards were enforced, the Burdekin River system faced contamination from lead, copper, cadmium and zinc as well as radioactive material, he said.

"The fact is that during the last wet season a substantial leakage occurred from the uranium ore stockpile at Ben Lomond," Senator Jones said.

"The next wet is due in a few months.

"The consequences of a slowly developing leak at Ben Lomond would be the pollution of the Burdekin system. Damming the river would ensure that heavy pollutants would accumulate in the reservoir," he said.

"Any proposal that puts the Burdekin River at risk of radioactive contamination cannot be justified in terms of the limited economic significance of the Ben Lomond deposit."

CSO: 5100/7503

BRIEFS

LICENSE FOR MINATOME--The controversial Minatome uranium project near Charters Towers in north Queensland may get the green light after direct discussions between the French-owned company and the state Mines Department. An application for an extra lease needed for the commercial exploitation of the uranium deposit at Ben Lomond, was refused by the Charters Towers Mining Warden in April. But the Mines Minister, Mr Gibbs, said last night that Minatome Australia Pty Ltd was working on a detailed report that could overcome the warden's objections. If department experts agreed with the company findings, a recommendation could be made to Cabinet. The Mining Warden, Mr Eric Lendich, recommended against the granting of the lease because of the lack of detailed geological and hydrological information about the site of a proposed tailings dam. Mr Gibbs said the company was investigating the geology of the area. "They probably should have done it before they applied for the lease," he said. "They had a lot of information, but not the detail that the warden needed." [Text] [Brisbane THE COURIER-MAIL in English 28 Sep 81 p 1]

DEMOCRATS' ANTI-URANIUM STAND--All Australian Democrat Parliamentarians were urged yesterday to use their influence to halt the uranium industry in Australia. This was one of the resolutions passed at the party's national conference in Brisbane. It sought to discontinue the uranium industry until safeguards in regard to mining, power generation, waste disposal with costing and security were considered safe. [Excerpt] [Brisbane THE COURIER-MAIL in English 28 Sep 81 p 3]

VANUATU ANTI-NUCLEAR POLICY--The Prime Minister of Vanuatu, Mr Lini, will ask the Commonwealth Heads of Government Meeting to call for the decolonisation of all French territories in the Pacific. Mr Lini said yesterday he believed the decolonisation question to be of the utmost importance to South Pacific countries. "It is impossible to have stability in the region while the situation in the French territories continues to exist," he said. Mr Lini also plans to raise at CHOGM the possibility of a nuclear-free zone in the Pacific and to call for a ban on nuclear testing and dumping. It is understood Vanuatu has the support of most Commonwealth Pacific countries for its efforts to ban nuclear tests and dumping. Countries backing the move are Australia, New Zealand, Fiji, Kiribati and Papua New Guinea. But it is unlikely to attract strong support for its moves to create a nuclear-free zone. Australia, New Zealand, Canada and Britain, who have nuclear-powered submarines, are certain to strongly oppose this. Mr Lini said yesterday that the Pacific countries were "very much against" nuclear testing by the French and plans by the United States and Japan to dump low-level waste material in the Pacific near Tuvalu. "But we are not so united on independence for New Caledonia or the nuclear-free zone. Vanuatu will of course press its views on these matters, which are well known," he said. [Text] [Melbourne THE AGE in English 29 Sep 81 p 4]

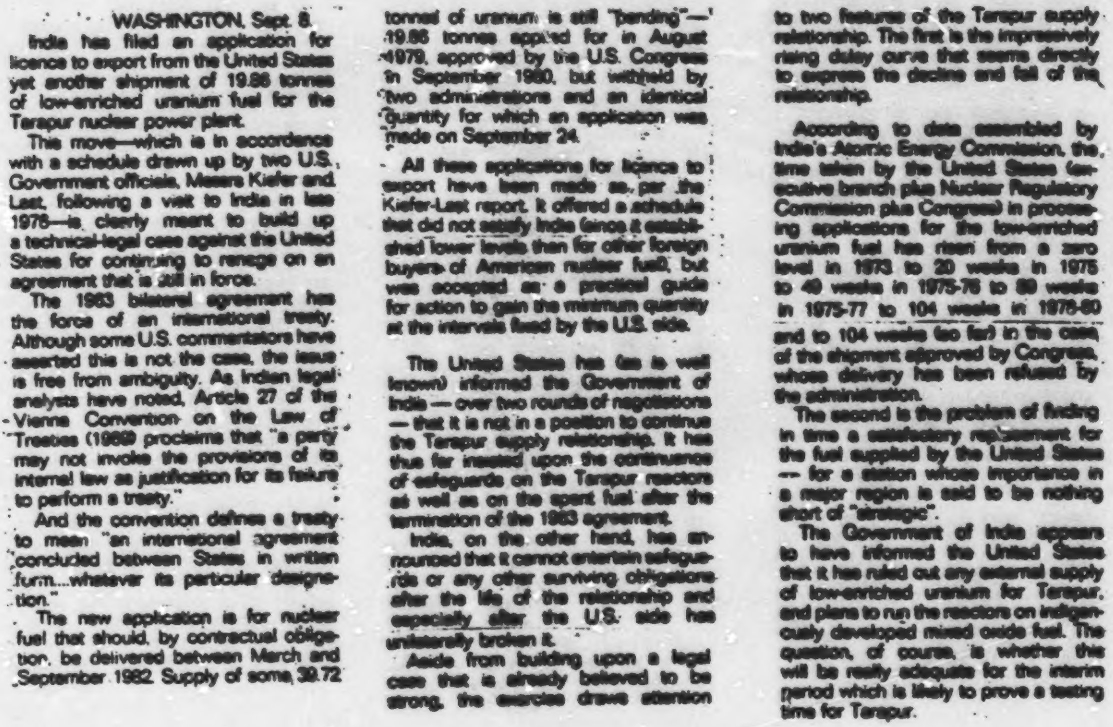
CSO: 5100/7504

APPLICATION FOR U.S. URANIUM SHIPMENT EXPLAINED

Madras THE HINDU in English 9 Sep 81 p 9

[Article by N. Ram]

[Text]



WASHINGTON, Sept. 8.

India has filed an application for licence to export from the United States yet another shipment of 19.86 tonnes of low-enriched uranium fuel for the Tarapur nuclear power plant.

This move—which is in accordance with a schedule drawn up by two U.S. Government officials, Messrs Kiefer and Last, following a visit to India in late 1978—is clearly meant to build up a technical-legal case against the United States for continuing to renege on an agreement that is still in force.

The 1963 bilateral agreement has the force of an international treaty. Although some U.S. commentators have asserted this is not the case, the issue is free from ambiguity. As Indian legal analysts have noted, Article 27 of the Vienna Convention on the Law of Treaties (1969) proclaims that "a party may not invoke the provisions of its internal law as justification for its failure to perform a treaty."

And the convention defines a treaty to mean "an international agreement concluded between States in written form...whatever its particular designation."

The new application is for nuclear fuel that should, by contractual obligation, be delivered between March and September 1982. Supply of some 39.72 tonnes of uranium is still "pending"—19.86 tonnes applied for in August 1979, approved by the U.S. Congress in September 1980, but withheld by two administrations and an identical quantity for which an application was made on September 24.

All these applications for licence to export have been made as per the Kiefer-Last report. It offered a schedule that did not satisfy India (since it established lower levels than for other foreign buyers of American nuclear fuel), but was accepted as a practical guide for action to gain the minimum quantity at the intervals fixed by the U.S. side.

The United States has (as is well known) informed the Government of India — over two rounds of negotiations — that it is not in a position to continue the Tarapur supply relationship. It has thus far insisted upon the continuance of safeguards on the Tarapur reactors as well as on the spent fuel after the termination of the 1963 agreement.

India, on the other hand, has announced that it cannot entertain safeguards or any other surviving obligations after the life of the relationship and especially after the U.S. side has unilaterally broken it.

Aside from building upon a legal case that is already believed to be strong, the exercise draws attention to two features of the Tarapur supply relationship. The first is the impressively rising delay curve that seems directly to express the decline and fall of the relationship.

According to data assembled by India's Atomic Energy Commission, the time taken by the United States (executive branch plus Nuclear Regulatory Commission plus Congress) in processing applications for the low-enriched uranium fuel has risen from a zero level in 1973 to 20 weeks in 1975 to 40 weeks in 1975-76 to 80 weeks in 1975-77 to 104 weeks in 1978-80 and to 104 weeks (so far) in the case of the shipment approved by Congress, whose delivery has been refused by the administration.

The second is the problem of finding in time a satisfactory replacement for the fuel supplied by the United States — for a station whose importance in a major region is said to be nothing short of "strategic".

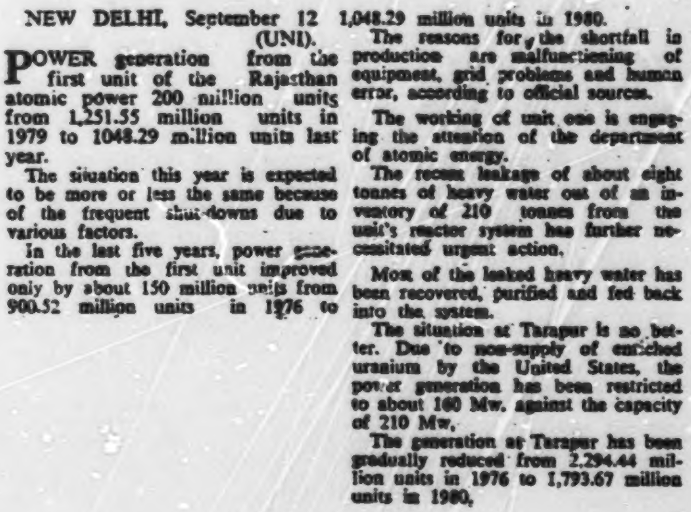
The Government of India appears to have informed the United States that it has ruled out any external supply of low-enriched uranium for Tarapur, and plans to run the reactors on indigenously developed mixed oxide fuel. The question, of course, is whether this will be really adequate for the interim period which is likely to prove a testing time for Tarapur.

CSO: 5100/7000

DROP IN OUTPUT FROM RAJASTHAN NUCLEAR PLANT REPORTED

Bombay THE TIMES OF INDIA in English 13 Sep 81 p 9

[Text]



NEW DELHI, September 12 (UNI).

POWER generation from the first unit of the Rajasthan atomic power 200 million units from 1,251.55 million units in 1979 to 1048.29 million units last year.

The situation this year is expected to be more or less the same because of the frequent shut-downs due to various factors.

In the last five years, power generation from the first unit improved only by about 150 million units from 900.52 million units in 1976 to 1,048.29 million units in 1980.

The reasons for the shortfall in production are malfunctioning of equipment, grid problems and human error, according to official sources.

The working of unit one is engaging the attention of the department of atomic energy.

The recent leakage of about eight tonnes of heavy water out of an inventory of 210 tonnes from the unit's reactor system has further necessitated urgent action.

Most of the leaked heavy water has been recovered, purified and fed back into the system.

The situation at Tarapur is no better. Due to non-supply of enriched uranium by the United States, the power generation has been restricted to about 160 Mw. against the capacity of 210 Mw.

The generation at Tarapur has been gradually reduced from 2,294.44 million units in 1976 to 1,793.67 million units in 1980.

CSO: 5100/7002

AEC CHAIRMAN SPEAKS AT VIENNA CONFERENCE

Bombay THE TIMES OF INDIA in English 24 Sep 81 p 7

[Text]

BOMBAY, September 23: India today condemned the "unprovoked and unjustified" military attack by Israel on the Iraqi nuclear research centre, at the 25th general conference of the International Atomic Energy Agency, being held in Vienna.

Dr. H. N. Sethna, chairman of the Atomic Energy Commission, who is leading the Indian delegation, told the conference that the "aggression" had threatened international peace and security, in clear violation of the U.N. charter. Also, it was an aggression by one member of the agency against another member and hence deserved "strong action" at this session of the general conference.

A copy of Dr. Sethna's speech at the session was released to the press here today.

Expressing India's concern over the attempts to erode the basic objectives of the IAEA as enshrined in its statute, Dr. Sethna opined that the best way to commemorate the silver jubilee of the IAEA was to once again recall the original objectives and not to allow extraneous issues erode these values.

INDIAN CONTRIBUTION

The agency's technical assistance scheme had been made subject to restrictive considerations in recent years, and India had renounced the acceptance of technical assistance but she would continue to participate in the scheme as a donor, he added. He reiterated that India would make a voluntary contribution of $97,600 to this scheme and would make available 12 fellowships for the benefit of the developing countries.

Referring to the deliberation on the proposed international plutonium storage, Dr. Sethna said India participated in the deliberations with an "open mind." He recalled the Indian view point, stated at the time of its accession to the statute, that the member countries had sovereign rights to decide on their own programme.

"We find that the present discussions are proceeding in a direction that may infringe on the sovereign rights of members and our participation in these discussions is, therefore, without prejudice to our rights as a sovereign nation," Dr. Sethna pointed out.

CSO: 5100/7005

BRIEFS

NUCLEAR REACTOR PLANS--Work on the two nuclear reactors at Kakrapar near Surat in Gujarat at a cost of Rs 382.52 crore will be completed within a period of 125 months from the date of financial sanction, the Lok Sabha was informed on Wednesday, reports PTI. A site selection committee has been set up to make recommendations for the other four reactors of 235 MWs each, proposed to be set up in the country during the Sixth Plan (1980-85) period, Minister of State for Science and Technology C.P.N. Singh told Mr Pius Tirkey in a written reply. [Text] [New Delhi PATRIOT in English 10 Sep 81 p 5]

U.S. THREAT DENIED--New Delhi, Sept. 17--Mr C.P.N. Singh, Minister of State for Science and Technology, denied in the Rajya Sabha today that the U.S. Government had threatened the Government of India with economic sanctions if it carried out a second nuclear test, report PTI and UNI. He told Mr Shiva Chandra Jha that the Tarapur atomic plant had received nuclear fuel containing approximately 5923 kg of U-235, against a total quantity of not exceeding 14,500 kg of U-235 till the contract period, which ends in 1993. He reiterated the Prime Minister's assertion that the Tarapur plant would be kept working with alternative means, irrespective of further fuel supplies from the U.S.A. [Excerpt] [Calcutta THE STATESMAN in English 18 Sep 81 p 9]

CSO: 5100/7003

BRIEFS

NUCLEAR ENERGY PROGRAM--Lahore, 6 October (JASARAT Report)--Pakistan's atomic energy commission chairman, Munir Ahmad Khan, has warned that if nuclear technology is not obtained our foreign reserves will be completely depleted within the next 4 years. The only thing we can do then is to import oil. In a detailed interview with the monthly URDU digest, he reiterated that Pakistan will continue to pursue its peaceful nuclear energy program. He said we are aware of the dangers threatening our peaceful nuclear energy program in the form of Israel and Indian opposition. He added: Despite India's psychosis regarding our nuclear program, the fact is that India signed an agreement with Canada in 1962 on the Rajasthan powerplant. He said that Pakistan's atomic energy commission was set up 11 years after the establishment of Pakistan, whereas India had set up its nuclear institute in 1948. He said the first reactor in Asia was in India in 1956, even before Japan. Our country is not aware of the meager resources we will have left 10 years from now. [Excerpts] [GF111924 Karachi JASARAT in Urdu 7 Oct 81 p 1]

CSO: 5100/4502

PROGRAM COST TO DATE PLACED AT 210 BILLION CRUZEIROS

Rio de Janeiro JORNAL DO BRASIL in Portuguese 20 Sep 81 p 28

[Article by Jorge Oliveira: "Nuclear Escalation Has Cost the Country 210 Billion Cruzeiros"]

[Text] Ten years and 210 billion cruzeiros after beginning what to some is nothing more than a foolhardy venture and to others is a reaffirmation of national sovereignty, Brazil this week enters the select club of countries that generate atomic energy. The reactor core of Angra 1, the Alvaro Alberto power plant, began receiving its fuel elements yesterday. On Tuesday the first Brazilian nuclear plant begins producing the steam that in December will power its generators.

Announced in 1967, in a statement made by then President Costa e Silva at Punta del Este, the Brazilian desire to compensate for a presumed impossibility of meeting its needs in the 1980's with hydroelectric power materialized 4 years later in the purchase from Westinghouse Corporation, of the United States, of a single nuclear plant--the one that is now being started up.

Today, however, due to an agreement signed with the FRG in 1974, Brazil wants to have eight nuclear plants by 1995, for which it is willing to spend $18 billion, according to Nuclebras, the corporate giant created to implement the program. But other estimates, backed by ELETROBRAS [Brazilian Electric Power Companies, Inc], show a final cost of not less than $26 billion, nearly half the nation's current net foreign debt.

Ironically, activation of the first Brazilian nuclear power plant occurs in a year during which, because of an economic slowdown due mainly to its huge foreign debt, Brazil cannot even use all the energy generated by its hydroelectric facilities. It comes, furthermore, at a time when the country is assured of having enough electric power to meet its needs until the end of this decade, even if energy consumption again begins growing at 10 percent annually.

But now the ambitious Brazilian nuclear program is being given a new set of clothes: it is being presented by the government as the factor that will assure the nation the complete and indispensable mastery of nuclear technology without which it would be at a disadvantage relative to its neighbors, particularly Argentina. Therein, in fact, lies the basis of the argument, although at no point did it enter into the speech with which former President Geisel announced the agreement he had signed with the FRG, the great inspiration for which had been the spectacular increase in petroleum prices.

In the "white paper" he distributed in an effort to explain details of the agreement, the then president predicted that the first Angra dos Reis plant, purchased from Westinghouse in 1972 with only 8 percent domestic components, would be operating in 1978; the two German plants, in 1982 and 1983.

Six years later, none of the former president's forecasts has been confirmed. Petroleum consumption fell [sic] from 1,122,846 barrels a day in 1979 to 1,131,226 in 1980 (through May of this year, it was 979,211 barrels a day). Domestic petroleum production increased from 165,825 barrels a day in 1979 to 191,512 barrels in 1980 (in May of this year it was 224,687 barrels a day, a situation that has remained unchanged).

The petroleum crisis, after the significant price increases beginning in 1973, caused a mad scramble by developing countries dependent almost wholly on outside suppliers to seek alternative sources.

Brazil, for example, sought in alcohol a substitute for gasoline, causing a drop in the latter's consumption of 30 percent to 18 percent in the last 2 years. At present, to give some idea, consumption of carburetant alcohol is 300 million liters a month. Consumption in 1979 was 2,235,000,000 liters and in 1980 was 2,648,000,000 liters.

Electric Power

The growth rate of electric-power consumption estimated for this year by ELETROBRAS will be 50 percent less than that of last year: it should have grown, according to forecasts, at 10 percent a month [sic; year?] and it has actually gained a little more than 5 percent.

The nation's energy production last year was the equivalent of $9 billion, about equal to petroleum imports. According to the 1980 ELETROBRAS report, domestic energy consumption [sic; production?] in 1980 was 120,720 gwh, of which 92.4 percent was of hydraulic origin, equivalent to 751,000 barrels of oil daily.

Installed generating capacity increased 11.8 percent in 1980, from 28,386 megawatts to 31,735 megawatts.

The figures that confirm a lower growth rate of demand for energy in 1980 and 1981, together with increased domestic production of petroleum and carburetant alcohol, explain why the nuclear program must be dressed up in a new way: justifying it as an indespensable source of additional energy production is no longer enough.

Germans Dominate NUCLEN

Transfer of nuclear technology is one of the most hotly debated points of the Brazil-FRG nuclear agreement. It becomes controversial when it is confirmed that in the major Nuclebras subsidiary, NUCLEN [Nuclebras Engineering, Inc], responsible for reactor engineering, the two major management boards--Technical and Commercial--are represented by KWU [Kraftwerk Union, AG], German firm associated with NUCLEN.

Although having only 25 percent of the capital, the minority stockholders have veto power and all important decisions must be made unanimously. There is, furthermore, a Technical Council, which includes only one Brazilian. A nonvoting member, at that.

Lack of Power

This disproportionate power in the Brazilian company is what led some well-known experts of the sector to quit as NUCLEN superintendent: Sergio Brito, David Simon and Joaquim de Carvalho, the latter now one of the severest critics of the Brazilian Nuclear Program and the Brazil-FRG Nuclear Agreement.

Regarding technology transfer, the points raised by analysts of the sector remain unanswered by Nuclebras. One question is the high price Brazil would be paying to buy the FRG reactors, inasmuch as costs paid for engineering services in Angra dos Reis plants 2 and 3 are nearly $800 million.

This amount represents $320 per installed kilowatt. The $800 million would be paid to NUCLEN by FURNAS [Furnas Power Companies, Inc], although it is not known how much of the total will go to the FRG and how much to Brazil.

Still analyzing the high price, some nuclear scientists estimate that Brazil will pay $20 billion of the $30 billion that will be paid for the eight German power stations, as they contend that Brazil would spend $10 billion to generate the same power from nuclear [sic; hydroelectric?] plants, at a price of $1,000 per installed kilowatt, compared with $3,000 for nuclear power. The analysts cite Japan in saying that 32,000 contracts for purchasing nuclear technology, made between 1950 and 1978, cost the country $9 billion.

Some former Nuclebras directors also have reservations about the agreements for the German technology Brazil intends to procure. Gen Dirceu Coutinho, for example, when leaving the NUCLEN superintendency, denounced the fact that Brazil has adopted the centrifugal-jet process, whereas the alternative would be ultracentrifugation, even if developing the technology in Brazil.

According to the general, the price of enrichment by centrifugal jet would be over $400 per unit of work, whereas the world price was $100 per unit of separating work. The process denounced by Coutinho, in addition to being expensive, is a big user of electrical energy.

Brazil, the scientists recall, developed the process of ultracentrifugation through the Institute of Nuclear Engineering. The group was disbanded after the agreement with the FRG was signed. The scientists recall that Brazil could even have developed the centrifugal-jet process along with the Germans. This group, which also worked on the chemistry of plutonium, was dissolved, causing research on fast-breeder reactors to cease.

There are still some persons in the government who are fearful about technology transfer. Jose Israel Vargas, secretary for science and technology, for example, finds that the concept of the reactor through the primary heat-exchange circuit--or the philosophy of the project, as it is frequently called--is not open to discussion. All the economic and technical controversies of this phase have been sealed from the public. They are not necessarily kept a secret, but they are beyond the reach of practical action. The visible part consists of the external aspects, more those of marketing than of technology.

8834
CSO: 5100/2007

CALS TERMS NUCLEAR PROGRAM SOVEREIGN, PEACEFUL

Rio de Janeiro JORNAL DO BRASIL in Portuguese 23 Sep 81 p 17

[Text] Development of the Brazilian nuclear program adheres to two basic criteria: national sovereignty and technology absorption. But the government affirms the atom will be used for peaceful purposes. That was the declaration of Mines and Energy Minister Cesar Cals yesterday in response to whether purchase of eight nuclear reactors from the FRG continues to be for energy purposes (as the nation now has surplus energy) or military purposes.

The mines and energy minister was in Angra dos Reis to observe the concluding work to load the reactor core of the first nuclear plant there with 121 fuel elements purchased for $30 million. Cals said the program will cost the country between $25 billion and $26 billion, including the fuel cycle, rather than the $18 billion announced by Nuclebras President Ambassador Paulo Nogeira Batista.

'Fair Price'

"Technology absorption is a question of sovereignty. The country that does not utilize nuclear energy will remain forever dependent upon other countries," the mines and energy minister said. He added: "The price being paid is the necessary price to acquire nuclear technology."

Cals further reported that the Itatiaia uranium-enrichment complex in Ceara to be developed by Nuclebras "is likely to pay for all the nuclear technology the country buys; it will be finished in the 1990's and will cost about $5 billion." Several companies, he said, are already interested in becoming partners in developing the project.

Some foreign companies (he did not say which ones) are willing to finance the project's nuclear phase--extraction and enrichment of uranium--and Brazilian firms are interested in producing fertilizer from the phosphates associated with the uranium in the Itatiaia reserves. The mines and energy minister also intends to install a nuclear plant there to supply power for the whole mining project.

Necessity

Cals declined to draw a significant parallel for the nation between nuclear power plants and the Itaipu hydroelectric facility. The latter, according to its president, General Costa Cavalcanti, was built for $700 direct cost and $1,000 indirect cost per installed kilowatt. Cals said only that both are needed: the Itaipu hydroelectric plant to provide energy for the South and Southeast regions and the nuclear reactors to provide mastery of the technology.

The mines and energy minister does not believe this technology can be acquired at a slower pace, as 20 years "is a very short time. It took us 25 years to master the technology of thermoelectric power plants," Cals recalled.

In order to acquire the technology of the whole fuel cycle, Cals said, contracts are being signed with several countries. The technology for uranium concentrate is French; enrichment is being developed by the Nuclear Research Institute in Brazil; "zircalloy," a moderating ingredient for nuclear reactions, is Argentine; the reprocessing plant will be German and the technology for developing the superregenerator reactors will be Italian.

Reactor Core

Loading the reactor core was finished at 1524 hours yesterday, after 121 fuel-element rods were placed in the core. The operation took 63 hours and began at 0004 hours Sunday. It took only 6 minutes to transfer the first fuel element, which has a primary neutron source, from the fuel storage building to the reactor. Everything had been prepared in advance.

Post-loading and pre-criticality tests will begin immediately and should last 63 days. During this time the pressure and temperature of the primary circuit will be raised to normal conditions. After loading and after it has begun to heat up comes the phase in which the reactor will be brought to "criticality" [capability of sustaining a chain reaction], generating nuclear heat for the first time, which will probably take place about the middle of November.

The plant will not be declared in commercial operation until it reaches 100 percent of its nominal generation of 626 megawatts. At the beginning of December the plant will begin to function, generating energy for the Southeast system at a 10 percent level, gradually reaching 100 percent of capacity and then operating normally at 70 percent of capacity. The first Angra dos Reis plant is to be reloaded 1 year and 6 months after it begins operating.

The plant's pre-operating tests are being conducted by 200 technicians, divided into 4 shifts. They include, besides the director general and four supervisors, fuel specialists, nuclear physicists, chemists, maintenance technicians, personnel specializing in radiation protection, in quality assurance and from the National Nuclear Energy Commission, the International Atomic Energy Commission, ELETROBRAS [Brazilian Electric Power Companies, Inc], Nuclebras and FURNAS [Furnas Power Companies, Inc].

8834
CSO: 5100/2007

MALAYSIANS PROPOSE JOINT URANIUM PROSPECTING IN MALAYSIA

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 29 Sep 81 p 37

[Text] Brasilia--Lew Sip Hon, Malaysian deputy minister of industry and trade, will come to Brazil next month at the head of his country's first official mission to Latin America. He will discuss with authorities of the respective sectors matters related to coal, petroleum and the technology of carburetant alcohol, and will sign a contract with the Mineral Resources Prospecting Company to prospect on Malaysian territory for uranium and other minerals. This was reported to O ESTADO DE SAO PAULO yesterday by diplomatic sources allied with the energy sector.

The deputy minister's party will include 14 businessmen, including some from Singapore.

Subjects related to agriculture and fertilizers will also receive the group's attention, but they are most interested in learning how Brazil can help them in the field of energy, 80 percent of which in Malaysia comes from petroleum. There is also interest in absorbing the technology of methanol for fuel production and of charcoal in producing ferroalloys.

In the case of uranium, Malaysia wants the Mineral Resources Prospecting Company to begin exploration as soon as possible, as there is proof that their country is rich in this ore, based upon earlier studies by Japanese companies. Should discussions on this subject bear fruit, Nuclebras may sign agreements for training technicians in Brazil, similarly to various plans for cooperation in this sector the Brazilian Government has signed with other countries.

In regard to petroleum, although Malaysia produces about 200,000 barrels a day, officials of that country consider it "imperative" to seek renewable-energy sources as a way to reduce their crude-oil imports. They intend to make agreements with Brazil in this area, on terms to be discussed during the mission's visit.

Brazil's exports to Malaysia are not very diversified. Processed and manufactured goods have been the major portion, although only 0.05 percent of the nation's exports. Brazil sells small-sized machinery and raw sugar, and buys rubber and some derivatives. At the end of 1980, their reciprocal trade was only $18.5 million.

8834
CSO: 5100/2007

KWU SAYS NUCLEAR PROGRAM TIMETABLE NOT BEHIND SCHEDULE

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 29 Sep 81 p 27

[Text] The FRG-Brazil nuclear program "is coming along quite nicely" and, despite the delays at the Angra 2 and Angra 3 power plants, it can be said that "the rate at which the Brazilian government has been conducting it is within the prescribed timetable," engineer Wolfgang Breyer said in Sao Paulo yesterday. He is on the Technico-Scientific Relations staff of Kraftwerk Union, AG, the company responsible for selling equipment and transferring nuclear technology to Brazil.

Breyer does not think the Brazilian government has any intention of delaying the program's implementation. In regard to the proposal made to President Figueiredo by cabinet ministers Cesar Cals, Delfim Netto and Danilo Venturini for making the program contingent upon actual transfer of nuclear technology, Wolfgang Breyer believes that, if accepted by the government, "it will in no way change the pace of installing nuclear power plants in Brazil." Subordinating progress of the nuclear program to technology absorption would imply greater flexibility, according to specialists of the sector, who feel that imposing this condition would permit the government, on the pretext of technology absorption, to slow down the rate of the program's implementation.

The KWU consultant, however, believes there is some redundancy in the suggestion made to President Figueiredo (some months ago). He argues that the FRG-Brazil program, with the eight nuclear power plants, was conceived to transfer technology and give Brazil total independence. "Hence, to the extent that the nuclear power plants are built, the degree of technology absorbed is constantly greater, so that when the last plant is completed Brazil will have complete control of the technology," he adds.

Lost Time

Wolfgang Breyer devoted a good portion of the interview he held yesterday to the FRG nuclear program, which, after some delays, now seeks "to make up for lost time." In this decade alone, he asserted, the capacity of nuclear power plants in Germany must increase more than 150 percent, from 9,000 megawatts in 1980 to 25,000 megawatts in 1990. This goal will be reached upon completing construction of 10 power plants and 5 others "in an advanced stage of licensing."

However, the five plants to which Breyer refers have been "in a final stage of negotiation for licensing" for several years. Now, he remarked, the FRG Government is revising the licensing process for the purpose of reducing delays and hence the cost of investment. Kraftwerk Union was forced to reduce production personnel by 40 percent at the beginning of this year due mainly to delays in its nuclear program, cancellation of the program with Iran and delays in implementing the Brazilian program.

Kraftwerk Union, says Breyer, "is optimistic about nuclear energy, as the 10 plants now being built in the FRG represent an installed capacity greater than the total now generated by the 14 plants already existing in the country."

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CSO: 5100/2007

BRIEFS

CNEN CONTROL OF RADIATION--Brasilia--Within a 15-kilometer perimeter around the Angra dos Reis nuclear power plants is where serious accidents involving radioactive contamination can potentially occur. Control of this area will be the exclusive responsibility of the National Nuclear Energy Commission (CNEN), which made studies taking into account topography, wind direction and water resources. Government technicians who commented on the subject in Brasilia yesterday said permission to operate the plants will depend upon information about the possibilities of contamination within that perimeter. Beyond the limit established by the CNEN, control will be the responsibility of the Special Secretariat for the Environment [SEMA], which is to submit by 10 October suggested supplemental rules for making periodic surveys about the indirect effects of radiation. In Angra dos Reis SEMA will act through the Rio de Janeiro environmental control agency, the State Environmental Engineering Foundation (FEEMA). Technicians of this agency will work mainly in analyzing products intended for human consumption, especially milk and garden vegetables. According to the same sources, the CNEN has arranged for a complete survey of the current situation of environmental resources within the 15-kilometer perimeter around the plants. These data, such as water temperature and radiation indices in ocean fauna, will be used as a parameter for the analyses to be made after the nuclear plants begin operation. [Text] [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 29 Sep 81 p 37] 8834

CSO: 5100/2007

COMMENTARY CRITICIZES U.S. NEUTRON BOMB DECISION

PY152221 Santiago Chile LA TERCERA DE LA HORA in Spanish 5 Oct 81 p 2

[Commentary by Oscar Pinochet de la Barra: "An Indispensable Nuclear Agreement"]

[Text] After a series of alternatives that were closely followed by international public opinion, U.S. Secretary of State Alexander Haig and Soviet Foreign Affairs Minister Andrey Gromyko decided to call an end to their war of words--which reminded us of the shouts and gestures of Japanese theater--and hold a meeting in New York, taking advantage of their presence at the UN General Assembly.

For those who still believe in the UN's effectiveness, this was an encouraging meeting. It is obvious that the importance of this meeting goes beyond the sphere of the United Nations. It is clear that the superpowers will once again try to achieve an almost impossible deed: to arrive at an agreement that will establish nuclear balance.

It is very difficult to negotiate with the Soviet Union over arms limitations. It is well-known, and the communists do not deny it, that one of the goals of Marxism is to spread this ideology to all countries so as to free workers, so they say, from capitalistic materialism and its abuses thus complying with one of the most highly sought objectives of Lenin and Marx.

This is why all arms limitations negotiations seem to be a mere pause until the world is in a proper condition to take another step--either peacefully or not--to achieve this ideal.

In view of this it seems almost naive that in tedious and endless meetings the Western world is constantly trying to achieve agreements that are tacitly accepted by the parties but that are difficult to control.

But the other alternative is war and today this means a nuclear war.

Carter and Brzezinski were not clever in dealing with the Soviet Union and they left the impression in the United States of having acted too naively while the USSR took advantage of this to arm itself to its teeth. Reagan and Haig went to the other extreme and decided to express their arrogance--which is also naive--to negotiate on a more firm basis.

But regrettably on 8 August the White House announced that the United States would build the neutron bomb. In this regard a large part of the Western world has maintained a guilty silence that has helped to show the moral decay of a so-called Christian world that is willing to trample over, or look the other way, when human life--the most valuable work of God--is trampled over.

To appease our conscience it has been said that the neturon bomb is more benign than the "regular" atomic bomb since it is capable of killing many people but causing minimum harm to buildings. The immediate reaction to this statement is that the neutron bomb is less "harmful."

There is in all of this moral perversion which is hard to admit but that sums up all of our evils: No one cares about man if all the houses are saved.

In this war of threats, President Reagan said on 2 September that the United States is willing "to launch an arms race that the Soviets cannot win." How about misery and hunger?

Fortunately, the Haig-Gromyko meeting has put things at the proper level: the level of negotiations, of respect for the adversary and respect for the rest of humanity.

It is true that negotiating with the Soviets demands a shrewdness and ability that not all presidents or ministers are obliged to have. But it is also true that the Soviets speak by pounding their fists on the table--godd manners are a bourgeoisie ailment--and they must be answered likewise. But threats, or even worse, pushing the world to a nuclear war is another thing.

Speaking to "statesmen and military leaders," Pope John Paul II referred to the Hiroshima bomb with words of peace. The pope was touched when he visited Hiroshima. Has President Reagan ever been there?

CSO: 5100/2014

VENEZUELAN ELECTED VICE PRESIDENT OF IANEC

Caracas EL UNIVERSAL in Spanish 14 Sep 81 p 2-21

[Text] The 12th meeting of the Interamerican Nuclear Energy Commission [IANEC] in La Paz, Bolivia has concluded. Venezuela was elected to the vice-presidency of IANEC and a member of the Advisory Committee of the nuclear organization.

The 12th meeting of the Interamerican Nuclear Energy Commission which was attended by 16 countries from the region, unanimously elected the Venezuelan Julio Cesar Pineda, executive secretary of the National Council for the Development of Nuclear Industrial Development (Conadin), as vice president of IANEC for a period of 2 years. The Venezuelan official also became a member of the advisory committee of this American organization which includes seven people, selected for their personal qualifications, their ability and their knowlege of the nuclear field. Julio Cesar Pineda, a lawyer and internationalist, with a rank of consultant minister in the Ministry of Foreign Relations and currently on assignment in the Ministry of Energy and Mining, has held diplomatic posts in Geneva, Mexico and in Moscow where he was the charge d'affaires after the departure of the ambassador, Regulo Burelli Rivas.

IANEC is the specialized advisory organization in the development of atomic energy on the American continent, and is comprised of all of the members of the OAS countries.

During this 12th Conference, held in Bolivia, IANEC put forth its program for the decade of the 80's, placing special emphasis on the development of the nuclear-electric programs in the region, and it supported the programs of prospecting and exploration for uranium, the development of nuclear technology and radiation protection and the perfecting of systems of nuclear information. Also considered was that which related to programs of human resources and assistance to countries in the preparation of standards and laws related to the various demonstrations of the peaceful uses of nuclear energy.

At this same meeting of IANEC, the nuclear commissions of the Andean countries signed a joint declaration for the purpose of promoting subregional programs of cooperation and to establish support mechanisms in the nuclear development of the subregion. Venezuela was ratified as the coordinating country in the Andean area for nuclear activity during the present year. The Venezuelan delegation to this 12th meeting of IANEC was composed of Dr Julio Cesar Pineda, executive secretary of Conadin; the internationalist, Mercedes Alegrett; the airforce captain, nuclear engineer Luis Hartman; and the charge d'affaires in Bolivia, Marco Tulio Castellanos.

At this conference, Venezuela confirmed its position regarding the peaceful use of nuclear energy and the necessity of considering alternative energy sources, the conservation of hydrocarbons, the condemnation of the proliferation of all nuclear arms and regional assistance and cooperation for regional development, both in the nuclear-electrical aspects as well as in the varied utilization of the atom in medicine, agriculture, research and industry.

The countries which comprise the new Advisory Committee of IANEC are Agentina, Colombia, Chile, Peru, Uruguay and Venezuela.

The presidency of IANEC will be in the hands of Bolivia until the next conference in 1982 which will be held in Uruguay.

9787
CSO: 5100/2001

BRIEFS

UNIVERSITY TO GET ATOMIC ACCELERATOR--The UAE University is to receive a cyclotron (an experimental atomic accelerator) from the International Atomic Energy Agency, Dr Mohamed Amiri of the university's science faculty announced last week. Dr Amiri represented the UAE at the IAEA's nuclear energy conference in Vienna. Dr Amiri added that the IAEA had also agreed to provide the university with isotopes for research work and had agreed to grant six scholarships for physics graduates from the university to study nuclear physics in scientifically advanced countries. [Text] [Paris AN-NAHAR ARAB REPORT & MEMO No 40, 5 Oct 81 p 5]

CSO: 5100/4703

JUELICH DIRECTOR ON NEED FOR NUCLEAR POWER

Bonn VORWAERTS in German 17 Sep 81 p 21

/Interview with Wolf Haefele, director of Juelich nuclear research center, by Nikolaus Piper: "What Is Meant by 'Progress' Now"/

> /Text/ Professor Dr Wolf Haefele is the director of the Juelich nuclear research center. Since 1960, he has played a decisive role in the development of the fast breeder reactor and is one of the most outspoken proponents of nuclear energy. In 1980, he was a member of the Bundestag fact-finding commission on "future nuclear policy" which proposed that the decision on large-scale use of the fast breeder be held in abeyance until 1990.

VORWAERTS: Professor Haefele, you are a professed proponent of nuclear energy. But as a member of the Bundestag fact-finding commission you agreed to the compromise decision providing for the option of turning our backs on nuclear energy until 1990. Would you call that a contradiction ?

Haefele: I think it was a sound decision, based on common sense and reciprocal political responsibilities. The compromise provides for all those aspects of the nuclear energy program to continue that actually can continue: the many light water reactors, the fast breeder prototypes in Kalkar, the high-temperature reactor in Schmehausen and a reprocessing plant. Nothing else is operational anyway. Nonetheless, we must also be laying stress on energy conservation measures. In an operational sense, it really does not make any difference during the next 10 years whether we decide in favor of one type of energy or the other. But in 1990, we will be able to say whether we want to let nuclear energy stand as is or whether we want to initiate a new phase of second-generation reactors and nuclear technology.

VORWAERTS: What is the political rationale for this compromise ?

Haefele: It kept us from voting eight to seven against nuclear energy. It was like the Austrian referendum that turned down Zwentendorf by 50½ to 49½ percent without really resolving the nuclear energy question-- because the issue has not been laid to rest in Austria, either.

VORWAERTS: The CDU/CSU opposes the compromise, saying that the need is not so much for fact-finding as for decisions.

Haefele: There is something to that; but this was not the task assigned to the commission. The decision can only be made by the governments concerned. And in this respect the federal government and the Land governments must not only make decisions but also be in a position to implement them.

VORWAERTS: Even if such decisions are diametrically opposed to the commission's findings ?

Haefele: The commission has laid out what the implications are if a decision is made in favor of one option or the other and at what point a real decision on matters of substance must be reached. But this has nothing to do with the light water reactor issue for example where a political debt would have to be discharged and decisions would have to be implemented.

VORWAERTS: The second part of the compromise dealt with the implementation of real conservation measures.

Haefele: I am glad to see you put it that way. To be sure— nuclear energy is one part of it. The fact-finding commission was astute enough to add the energy-saving measures to it as being of equal importance.

VORWAERTS: The only thing is that real savings in energy are not as easy to document as the construction costs of a nuclear reactor.

Haefele: Exactly. That is why we said that we must first save energy for 10 years before we can tell whether it is politic to rely on such measures to some extent or not. I do believe it will take 10 years for us to find out what the advantages of energy conservation are. By the same token, nuclear energy will offer us some advantages over the next 10 years as well.

VORWAERTS: Then you also believe we have 10 years to make up our minds about the fast breeder ?

Haefele: That is the other side of the coin. We are not talking about the SNR 300 in Kalkar; that is just a prototype. What we are talking about is whether we want to go on to large-scale projects and build several high fuel cycle breeders and all the rest.

VORWAERTS: But you seem to think that we are already in a position to jump into breeder technology now.

Haefele: Yes; that is my personal view.

VORWAERTS: And you also think that both the reprocessing and the waste disposal problem can be solved ?

Haefele: Yes. Reprocessing brings technical experience to bear that can only be gained, if one really builds a plant. There is always talk about waste disposal being an unsolved problem; but the real unresolved question is what technical methods to employ to dispose of the wastes. Once these methods are established —which is a political decision— technology can abide by these methods at fairly great expense. The problem is a political one.

VORWAERTS: But there were some very tangible problems that came up in the Gorleben debate.

Haefele: "How safe is safe enough," as the saying goes. There is no technical answer to that question; only a political one. This is another way of saying: is a 10 billion to one risk of accident too great or is it not; this has to be looked at from a political point of view.

VORWAERTS: Can you answer the question to your own satisfaction ?

Haefele: I would say so. To my mind, an accident probability of 10^{-7} per year —even if there were severe consequences— is so small that there no longer is a chance of an accident in the true sense of the word happening. But you put a question to me personally. There are other people beside me, however.

VORWAERTS: Your name is more or less synonymous with a certain optimism as regards nuclear energy. Has the anti-nuclear movement shaken that belief of yours ?

Haefele: No— and I am not just blindly reiterating my position. These doubts concerning nuclear energy simply do not convince me personally. I can only explain it to myself, if I view the protest as really reflecting a more profound question of meaning that is not articulated as such. Now that is something I can share because I can see my own children posing new questions of meaning today. But I think they ought to be articulated in other ways than in doubts about the need for energy.

VORWAERTS: In other words, you are also unable to agree with the rational arguments against nuclear energy such as those propounded by Robert Jungk ?

Haefele: Jungk's arguments least of all; more likely Mr Meyer-Abich's who also represents a different school of thought. I can communicate with him. I may have different ideas on the subject but I can see why the questions are being asked and have a good deal of understanding for them. After all, Meyer-Abich and I have jointly worked out and put on the table the criteria for the evaluation of energy systems.

VORWAERTS: What about the question of meaning, as far as you are concerned— does it not concern energy as much as anything ?

Haefele: The most urgent question of meaning for today is: where is 'ahead' ? For our fathers and the generations that preceded them the question arose from social need which, after all, was a factor contributing to the emergence of the SPD. It is no accident that you newspaper is called VORWAERTS. /Forward/— that meant the improvement of unacceptable working conditions of most of the German people. That is not as obvious today as it was then. To live even more comfortably has become a questionable proposition. On the one hand, the Swedish example is not particularly stimulating and on the other hand, the situation in the southern part of the world is so hair-raising that it may not really be a worthwhile goal to emulate 'Sweden'. The military situation has grown so complex that it is no longer self-evident where 'up ahead' really is. But even if you could visualize an overpopulated globe, pacified by some rigorous political system, where would 'up ahead' be then ? By nature, man is constituted in such a way as to move into the open, to move forward.

VORWAERTS: Well, nuclear energy was related to the promise of almost unlimited possibilities— at least for a time.

Haefele: That is true; and it was not a good thing. It was a kind of euphoria that came out of the war, from America; a continuation of last century which implied that satisfaction is guaranteed as soon as material conditions improve sufficiently. There were studies published then that said how easy everything would be once energy would be supplied free of charge. There was a civilizing euphoria that took hold of nuclear energy then which now has come back to haunt us. It was an historical error.

VORWAERTS: What about today ?

Haefele: In a very real sense, we have a need for energy today; we need a substitute for oil; we need electric power. That has nothing to do with euphoria; it is a painful necessity. But the marriage with euphoria which nuclear energy contracted has cost nuclear energy a lot of support, without a doubt.

VORWAERTS: Will there be another historic compromise between the members of the fact-finding commission who support nuclear energy and those who oppose it ?

Haefele: This commission has made it its business to look into the entire question of costs in much greater detail than the first fact-finding commission. Over the past year, we have also grown more sensitive to the question of costs. We are beginning to realize once again that unlimited funds simply are not available. That is why there will be much more argument than last time; things are going to be much more difficult this time around.

9478
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SPENT NUCLEAR FUEL RETURNED FROM FINLAND TO USSR

Enviable Waste Shipment

Helsinki SUOMEN KUVALEHTI in Finnish 28 Aug 81 pp 18-21

[Article by Juhani Virkki]

[Text] Strictly speaking, we should not be talking of a nuclear waste train. In practice, however, spent fuel from nuclear power plants is today worthless waste. It is not bought nor do many countries get rid of it even if they pay for the privilege. The Loviisa nuclear power plant is an enviable exception to the rule.

A rise in the value of spent nuclear fuel is pure speculation, but perhaps soon, at the end of 1,000 years of change, the situation we still believed in some 10 years ago will recur. At that time the recycling of spent fuel, by means of reprocessing, back into modern-type or second-generation power plants, the so-called breeder reactors, was considered to be in the process of rapid development.

Now, there are only a few reprocessing plants and even fewer breeder reactors. The number of nuclear power plants has gone beyond the 300 limit and will climb to almost a thousand by the end of the 1990's. Nations that have reprocessing plants are more and more filling their capacities with nuclear fuel from their own power plants and nuclear weapon production.

10 Years of Negotiations

Although the latest agreement on the shipment of spent nuclear fuel was signed by Imatran Voima (IVO; Imatra Power Company) and the Soviet Atomenergoexport (AEE) as recently as early June, the matter was in principle already settled in 1970 when the procurement agreement for the Loviisa 1 plant was signed.

"The option on the return of fuel was such that the AEE is ready to either receive — or, as they at that time still ventured to say, 'buy back' — spent fuel or to perform reprocessing services by means of which it would at least recover its nuclear materials from the fuel," said Heikki Vayrynen, head of the IVO Power Plant Department's Nuclear Technology Office.

The same assertions are also included in the agreement signed in 1971, which set the terms for the agreement on both unused and spent fuel. Then came the bilateral agreement between the two countries on peaceful cooperation in the use of nuclear energy, which posed an obstacle. It stated what Finland may export to the Soviet Union, followed by a comma and "not, however, nuclear material." This obstacle was eliminated in 1975, but it took another 3 years before a record of the principles involved was made of the cornerstone of the final agreement.

"There were two reasons why negotiations did not proceed smoothly. On the one hand, there were still few shipments of fuel to the Soviet Union from abroad and, of course, for that reason too the IVO was prudently cautious as a buyer of service. On the other hand, they knew that the first shipment would not be of current interest before 1981," Vayrynen said.

"As I understand it, the Soviet Union's willingness to get the fuel back remained the same the whole time. Eagerness is, of course, hard to measure when, as we have noted, matters have become all topsy-turvy. The value of the goods dropped to zero on the world market and even to a negative figure.

"As regards the Soviets' attitude, we have the impression that the return of the fuel is a matter of principle for them. We know that the matter has been presented as an outright demand to many other countries. This is naturally a way of guaranteeing surveillance over the diffusion of materials that might be used for nuclear weapons."

Agreement Involves Number-One Reactor

The current IVO-AEE agreement involves the Loviisa-1 plant and covers its entire lifetime, or still a good 20 years. The next shipment will be next year, but the following one will not be before 1985. This is because the storage time for spent nuclear fuel at Loviisa has been extended from 3 to 5 years. In the background there are technical reasons: This year fuel elements that have to be removed from the reactor will have been in the reactor for the maximum-allowable time, or 3 years. Because of their greater radioactivity and heat energy, there is good reason to extend the storage time.

Shipment of reactor number two's first exchange consignment will not become a matter of current interest until 1984. The agreement that is to be made before then will be honed down in the light of this and next year's experiences. At the same time it will be agreed on whether one big or two small shipments a year are to be made at the end of the decade. Each reactor produces 14 tons of spent fuel a year.

The first shipment meant 3 weeks of working with three shifts for the IVO. "We estimate that we need a minimum of 2 and 1/2 weeks. The rolling stock was provided for 5 weeks because the Russians estimated that we would need that much time," Vayrynen said.

The rolling stock was received in Viipuri on 29 July. It included two locomotives which were switched coming and going in Vainikkala, four fuel-transport cars, two accompanying cars with safety equipment for the shipping containers and room for the crew, two empty buffer cars and a caboose for the IVO's own communications and other equipment. The IVO's own highway equipment was used between the railroad station in Loviisa and Hastholmen.

"Slight radioactivity in one of the shipping containers and a breakdown with some of the highway equipment delayed the operation for maybe a couple of days. This time too, the safety precautions were perhaps stricter than usual. The work moves very slowly since the containers can only be handled one at a time. Furthermore, the containers require a couple of days for the temperature to come down before the return trip can begin."

5 Million Fuel Buttons

So, 3.5 tons of spent fuel that was removed from the reactor in 1978 were placed into each shipping container. In a filled reactor there are 349 fuel elements. Each element is a hexagonal steel tube containing 126 3-meter-long fuel rods and there are 126 "fuel buttons" in each rod, altogether over 5 million.

Over 95 percent of the spent fuel is natural uranium. The rest is divided up among uranium isotope U-235, which is essential to a nuclear reaction, plutonium and so-called products of fission. There were about 140 kg of U-235, perhaps about 70 kg of plutonium and about a half a ton of these extremely radioactive fission products in the 14-ton consignment shipped from Loviisa, which is why safety precautions were needed.

After 3 years of storage, the fuel's head energy and radioactivity had dropped to about one one-thousandth of what it was. The material was nevertheless still very dangerous: "We would never even think of shipping fuel without thick containers. In its proximity you would get a lethal dose of radiation in just a few seconds," Vayrynen said.

At Loviisa spent fuel is stored in water cisterns several meters deep. The shipping containers are also filled and sealed in water.

"Practically speaking, the water in the Loviisa cisterns is pure and this time too we confirmed the fact that the shipping containers did not introduce any radioactivity into it. At the time the surface of the containers was inspected even before the water was removed and the containers filled with nitrogen."

"There Are All Kinds of People"

In the opinion of the news media and through them the public, the shipment set in motion from Hastholmen on the 17th was kept annoyingly secret. As far as the IVO is concerned, Heikki Vayrynen regards the matter in this way:

"In our planning we started with the assumption that a shipment of dangerous material is not a dangerous shipment. Thus advance notification of the public was not necessary. For the news media the fuss was over being in a state of emergency readiness in the event that something unexpected should happen, and this was not even unexpected.

"We had three plans: a shipment, an accident readiness and a security plan. The security plan was the only one announced to be secret, naturally — otherwise it would have been worthless. By international standards there is really no rule governing secrecy, but we felt that openly informing the public would have taken the teeth out of our security precautions.

"We also wanted to keep the time of shipment secret and then it became such a hot news item that the matter itself took second place. But anyone who wanted to know would go and see when the train was leaving and then even run alongside it. The fuss over secrecy is much less of a bother than some other kind of fuss.

"The world is full of all kinds of people. A couple of hundred ordinary citizens at the railroad station in Lahti, for example, don't worry us, but just one psychopath is too much. He would hardly be capable of doing any real damage, but he could nevertheless cause a fuss so that, in spite of everything, the train would be in danger. Or someone might chain himself to the rails to draw attention to himself...."

The VR [State Railways] had planned a night schedule for the rail shipment, the reason for which was that the train should not run into any rolling stock or other sensitive shipments. At night it would also be easier to keep watch over the crossings of which, including "cow paths," there were perhaps over 200 along a stretch of less than 500 km.

Vayrynen does not feel that the stretch of track from Loviisa to Lahti is a security risk: "Since the VR has set axle-weight and speed limits and since we operate below both of them, even more noticeably so as concerns speed, there is no cause for fear."

Same Objective for Power Plant Number Three

The IVO is also aiming at the same sort of fuel agreement for its future nuclear plants. A feasibility study for the third power plant is right now in progress with the French firm, SOFRATOM [expansion unknown], and its old supplier, the AEE. According to the IVO, there is reason to decide on bids by 1983.

"I would not, however, so absolutely categorically state that the IVO would only consent to an agreement like the present one. The work has barely begun and the partners have been so chosen as to be able to at the same time also map out their abilities to provide services for the treatment of fuel waste," Vayrynen said.

"The best alternative would, of course, be for the waste not to come to us. We are trying to see to it that, if and when we conclude an agreement for the supplying of a power plant, the fate of the spent fuel will simultaneously be decided on too. Thus the matter would not be postponed until the 1990's, when the power plant would be built."

Other Waste Stored in Cave

Helsinki SUOMEN KUVALEHTI in Finnish 28 Aug 81 p 21

[Text] Nuclear power plants also produce other radioactive material than spent fuel. This so-called power-plant waste is divided into mid and low-level radioactive waste. Mid-level radioactive wet waste — for example, different kinds of filters — accumulates in cleansing the water used in the plant's processing circuits of radioactivity from, for example, corrosive products and materials that may leak from the fuel.

Low-level radioactive waste is dry matter. The protective clothing, bits of board, tools, etc. included in this category are most typically produced in connection with plant annual plant maintenance operations.

Several tens of cubic meters of wet waste and less than 100 cubic meters of dry waste requiring further treatment have so far accumulated. The storage plan has been drawn up on the assumption that, when in time fuel leaks become more common, about 250 cubic meters of wet waste a year could accumulate.

Wet waste is at present stored in tanks on the plant grounds. Dry waste is either baled or put into barrels.

The IVO has a plan ready which includes a so-called plant for stabilizing wet waste with concrete and intermediate storage of the concrete blocks it produces. A decision on the construction of the plant has not yet been reached. This will essentially depend on how fast wet waste accumulates; its current level is considerably lower than what is referred to as normal.

The ultimate storage of waste in concrete blocks in a rock shelter to be blasted into the rock at Hastholmen is also linked with the plan. The suitability of the bedrock was tested a couple of years ago to a depth of from 50 to 120 meters. There is nothing that has become apparent in the plan which might prevent realization of the rock shelter storage facility.

Next June the IVO will submit a so-called site report, in which it is proposed that waste could ultimately be located according to the plan, to the Ministry of Trade and Industry.

The IVO and the Industrial Power Company (TVO), which owns the Olkiluoto power plants, do not feel it very likely that power-plant waste will ultimately be located at a common site in Olkiluoto or Hastholmen or in some entirely different third community.

TVO Considers Temporary Solution

Helsinki SUOMEN KUVALEHTI in Finnish 28 Aug 81 p 21

[Text] Each of the Olkiluoto power plants produces 18 tons of spent fuel a year. So far, about 200 cubic meters of plant waste has accumulated in them. At Olkiluoto wet waste has already been "baled" since both plants have bituminous coating plants. TVO plans for the ultimate locating of mid-level radioactive waste are the same as at Loviisa.

The TVO has not succeeded in arranging for the shipping of spent fuel out of Finland. Last year the TVO rejected an English offer for the reprocessing of fuel. They felt that the bid was too high in addition to the fact that it would have covered only a year and a half's accumulation of spent fuel and the so-called reprocessing waste would have been returned to Finland.

The TVO is at present investigating two alternatives. On the one hand, it in principle has an open line to Sweden where the TVO would get a central storage facility, to be built at Oskarshamn in 1985, for the intermediate storage of spent fuel for 25 years.

On the other hand, the TVO is investigating its own alternative, that is, the construction of an intermediate storage facility alongside its plants with a capacity of over 20 years. The present cistern space will be filled by the early 1990's. According to TVO general manager Magnus von Bonsdorff, the alternatives will be decided based on cost. Olkiluoto's current license to operate will expire at the end of 1983. A new license application must be filed next year and von Bonsdorff says that "matters must be settled by then."

The TVO does not expect any new reprocessing bids. Neither of its alternatives are aimed at reaching a final decision for "several decades." There will then be two alternatives: reprocessing or the storing of spent fuel in Finnish bedrock.

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30 October 1981

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 121

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30 October 1981

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 121

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BRIEFS

URANIUM DEPOSIT EXPLOITATION--Cordoba, 28 Sep (TELAM)--A spokesman for the National Atomic Energy Commission has announced that the Los Gigantes uranium mine will probably start production in the middle of 1982. Its initial yield is estimated in 100 tons of concentrated ore. [Buenos Aires TELAM in English 1100 GMT 28 Sep 81 PY]

CSO: 5100/2017

BRIEFS

ANGRA I POWERPLANT RECEIVES NUCLEAR CHARGE--Rio de Janeiro--With the loading of the first uranium charge in the Angra I nuclear power station, Brazil entered the nuclear age. It could still take many months between loading and actual generation and commercial utilization of nuclear generated electricity but one official of Westinghouse, the American company that built Angra I, told Brasil energy "...this is the end of the construction phase and the beginning of the operational phase." Even though the loading was four years behind schedule it took place during an elaborate inaugural ceremony attended by high ranking government officials including Mines and Energy Minister Cesar Cals, ELETROBRAS President Costa Cavalcanti, Furnas [Electric Company] President Licinio Seabra and others. The actual loading amounted to placing 121 elements, totaling 50 tons of enriched uranium into the core of the reactor. When fired-up, or heated-in a gradual process that is scheduled to start in November and become fully operational by next March--the plant should have the capacity for producing 626 MW which will feed electrical current into the Furnas power network in southeast Brazil. A critical pre- and post-firing test still has to be run to check out the functioning and safety of the equipment before steam is actually produced to turn the generator and produce an electric current. That means that the firing will only take place in November if everything works out perfectly according to plans. The four year delay in the inauguration indicates things are not working out according to the nuclear plan. Delays in construction and faulty equipment were blamed for Angra I being so far behind schedule. [Text] [PY091514 Rio de Janeiro LATIN AMERICA DAILY POST in English 8 Oct 81 p 7]

URANIUM PROCESSING--If the processing of the uranium ore from the country's largest deposit found in Ceara were to be made in Bahia, it would cost $120 million. But since the decision was made to build an industrial complex in Ceara, including a nuclear plant to supply energy, that cost will be $5 billion. The most weighty political argument in dealing with the question is that "the uranium from Ceara will never be processed in Bahia." The Itatiaia industrial complex will be built in two phases, according to information technicians of the nuclear sector gave yesterday in Rio de Janeiro. In the first phase in 1983, a pilot unit will be installed to develop the process for concentrating uranium in the form of yellow cake. This will take a year. By mid-1985 the second phase will begin with the construction of a complex for production of yellow cake on an industrial scale. Construction of this industrial complex will be completed in 2 years. [Text] [PY092109 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 6 Oct 81 p 1]

CSO: 5100/2017

BRIEFS

URANIUM SHIPMENT RECEIVED--The National Nuclear Research Institute has received the first shipment of enriched uranium, which had been embargoed by the United States. The uranium weighs 2.5 kg [as heard] and has an estimated cost of 5 million pesos. However, the person in charge of the nuclear reactor installed by the organization in Salazar in the State of Mexico, denied that the uranium had been embargoed by the United States. He explained that what had occurred were bureaucratic problems. The necessary packing for the physical protection of the uranium was made up of three containers weighing 500 kg and this is the first shipment. The second shipment will be made next week. [Text] [PA131934 Mexico City International Service in Spanish 0300 GMT 10 Oct 81]

CSO: 5100/2017

BRIEFS

IAEA LOAN FOR 1982 PLANS--The International Atomic Energy Agency [IAEA] has approved projects related to the Uruguayan nuclear program, including technical assistance amounting to $218,000. Thus, the development of national nuclear projects will be supported during 1982. Meanwhile, the 25th General Conference of the IAEA will close today. It began on 21 September at the organization's headquarters in Vienna after the governors had held their own meeting. Luis H. Meyer, the Uruguayan governor, attended these meetings. [Excerpt] [PY151109 Montevideo EL DIA in Spanish 26 Sep 81 p 8]

CSO: 5100/2018

BRIEFS

URANIUM DEPOSITS DISCOVERED--Cairo, 17 Oct (MENA)--Field studies conducted by U.S. and Egyptian experts indicate the existence of 7,000 sites in Egypt containing deposits of the nuclear raw materials uranium and thorium. The National Center for Remote Sensing also participated in these studies. In today's edition, AL-AHRAM says that the comprehensive satellite survey covered about 200,000 square kilometers and that it has confirmed the existence of 50 sites in which uranium production seems economically feasible. Detailed studies have been made on four of these sites. Geological missions have discovered about 20 uranium "veins" embedded in granite boulders along the Qinah-Safajah Highway. They are estimated to contain a reserve of about 5,000 tons of raw uranium. Studies have also indicated that the confirmed uranium reserves of Egypt amount to around 14,700 tons. [Text] [NC170824 Cairo MENA in Arabic 0640 GMT 17 Oct 81]

CSO: 5100/2017

FINLAND

NUCLEAR-PLANT WASTE TO BE BURIED IN ROCK

Helsinki HELSINGIN SANOMAT in Finnish 27 Sep 81 p 29

[Article by Risto Valkeapaa: "Nuclear Waste To Be Buried in Bedrock"]

[Text] Workers are furiously boring holes into bedrock at Loviisa and Eurajoki for the permanent and secure burial of dangerous radioactive waste from nuclear power plants.

Basic work, from the point of view of nuclear waste treatment, is being accomplished in autumn winds and rains on the island of Haltholmen at Loviisa and on the Ukopaa Peninsula of Eurajoki's Olkiluoto.

Drilling in the bedrock goes on from early morning until late at night, and a final location is being sought for a large cave for the final disposition of nuclear-power plant waste.

A final disposal site is part of the terminology of nuclear power people and means a place where radioactive waste can be stored with the certainty it will never bring harm to anyone.

Thus, a study is being conducted on a place where power plant waste can be deposited. This, for its part, is the refuse created during the operation of a power plant: rags, sawed-off pieces of plank, and active liquid substances. All this refuse will be poured into coucrete before it is deposited in the cave. At Olkiluoto it will be packaged in bitumin.

As far as power plant waste is concerned, the most radioactive will not be safe for the environment until 500 years from now. The guaranteeing of safety means a challenge to the engineers.

It is also apparent that discharge waste from the plants will also be deposited in the same cave. For the time being, no one can say to what degree the nuclear power plants will in time be dismantled, but apparently the innermost portion of the cave will be the disposal site for the plant's pressure vessels. After spent fuel, they are the most active portions of a nuclear power plant. The pressure vessels will remain dagerous to the environment for at least 1000 years.

The fact that the darkness of night does not even stop the progress of work attests to the tight work schedule. The power companies are not wasting any time. The tight work schedule has resulted in the fact that the last holes are already being drilled at Loviisa, for example. These holes will locate the final spot for a cave 200,000 cubic meters in size.

On the drawing boards it is drawn to a depth of 120 meters below sea level. Approximately the same amount of rock in meters will cover the waste. The refuse will be sent down a 1-kilometer chute.

The plans of Teollisuuden Voima [Industrial Power] are not as clear-cut as those of Imatra Power. Analyses conducted on the flow of water will after a few months determine whether a portion of the storage area should be made into underground silos.

Swedish Example Accelerates Work in Finland

Teollisuuden Voima's problem has been fissured bedrock. It has not been possible to find a large enough area of rock mass composed of the same kind of rock on Olkiluoto's Ulkopaa Peninsula. Rock fissures, for their part, are not satisfactory since radioactivity can travel along them to the earth's surface.

However, there are no significant differences in the time schedules of the Finnish power plants. The research phases of both the plants should conclude by the end of next summer, when the reports on the final disposition of nuclear waste with respect to both plants will be completed. A decision concerning the continuation of this project will be made on the basis of these reports.

However, it already appears that a continuation is a foregone conclusion. Both power companies have announced that their caves will be ready for test use in 1986.

In the planning of these caves for the dumping of waste, Finland is running even with its favorite international competitor, Sweden. They are running neck and neck toward the chalk line of the final solution. Sweden intends to have its cave, to be constructed in Forsmark, ready for experimental use toward the end of 1987. All of that country's nuclear power plant waste will be concentrated in the Forsmark cave.

Concerns about waste in Sweden are completely different than those in Finland, there are 12 nuclear power plants in operation in Sweden. The accumulated waste already amounts to 7,500 cubic meters and threatens to increase to 40,000 cubic meters by the end of this decade. The Finns have only small amounts of waste: we have only 230 cubic meters stored in a solidified form.

Then why this spurt of competition?

The fundamental reason is, of course, Finnish legislation and usage permits. They comprise the basis of a program, which is now being accomplished without any delays.

In the background, however, is the threat of matters becoming complicated as the worst imaginable impetus. Finnish nuclear power experts know the situation in Sweden well and its effects on the nuclear power industry.

A heated nuclear power debate in Sweden resulted in a conditional law and a referendum. The conditional law culminated in a principle of complete security and the referendum meant that no new nuclear power plants can be built in Sweden.

The principle of complete security, for its part, makes all construction connected with nuclear power expensive. It forces the Swedes to make fairly expensive decisions in order to guarantee progress.

Debate Smolders Under the Surface

The Finnns have become accustomed to the fact that issues come slowly but surely across the gulf on a Swedish boat. It is expected that the same will happen with respect to nuclear power thinking.

A nuclear power debate is already smoldering beneath the surface in Finland. The nuclear power people instinctively feel that it is coming and they even approve of it. Managing Director Magnus von Bonsdorff of Teollisuuden Voima, among others.

A discussion is being conducted on economic issues relating to nuclear power, but we have not yet had reason for the Swedish-type large-scale debate, states Bonsdorff.

But what could then bring this smoldering debate above the surface? It could, of course, flare up unexpectedly, but it would be strange if the next large power plant decision does not arouse some kind of a discussion. Imatra Power has stated publicly that a decision will be made in the middle of 1983.

In the final count, nuclear power issues will be weighed by something other than a paperweight. If, indeed, an extensive discussion occurs, it cannot help but complicate the issue. This is also one important reason for resolving the nuclear waste problem without any delays.

The Swedish example has already demonstrated that social pressure can introduce completely new factors into planning. Then engineering skills will no longer resolve everything. Economic calculations are also beginning to raise complications.

Sweden Rejects Drilled Well Theory

Within the circle of experts, the issue of the final disposal of nuclear waste is not considered to be the most difficult technical issue connected with nuclear power -- rather that problem is close to being resolved.

But in the opinion of the Finns, Swedish engineers have succeeded in making it more difficult than is perhaps necessary. The effects of extraordinary pressures caused by society, for example, are also seen as a factor in this.

The Swedes are planning the construction of waste storage caves under the sea to ensure that they will be protected from all outside influences. In the background is the drilled well theory according to which the risk of outside effects is greater on dry land than at the bottom of the sea. The Finns intend to make their cave under dry land. Finnish experts say that the Swedish plans deviate from general safety thinking prevailing in the world.

Going under the sea also means an increase in costs. Field tests alone become more expensive when they have to be conducted from a floating raft.

It is also not completely certain that the Swedish solution is better from the point of view of safety. A joint Nordic study concluded in the middle of September, arrived at the conclusion that risk studies did not demonstrate any clear differences between disposal locations.

The study is the result of 4 years of work. It is a joint Nordic study, which has also promoted the creation of a common language in the Nordic nuclear waste discussion.

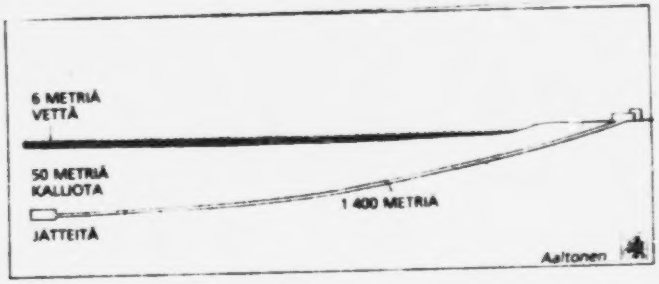
Finland was represented in the study by the State Technical Research Center, which also compiled it. The Finnish planner in the study was Doctor of Engineering Heikki Reijonen of the Electrical and Atomic Engineering Laboratory of the VTT [State Technical Research Center].

Where will the Swedish thinking lead? At this time, at least, it is guaranteeing a feeling of security for the people. They intend to put steel and concrete into Forsmark cave so that flow studies of the type we are conducting will not in practice be needed at all. With this system radioactivity will remain contained without packaging, say the experts.

In spite of far-reaching plans a final solution has still not been reached in Finland. It will still be influenced by the Loviisa and Eurajoki decisionmakers in the construction phase and naturally by the Radiation Safety Institute.

The word of the people and officials will also be considered. But in order that the question of power plant waste does not become sidetracked, researchers point out that its final disposal does not involve significant risks.

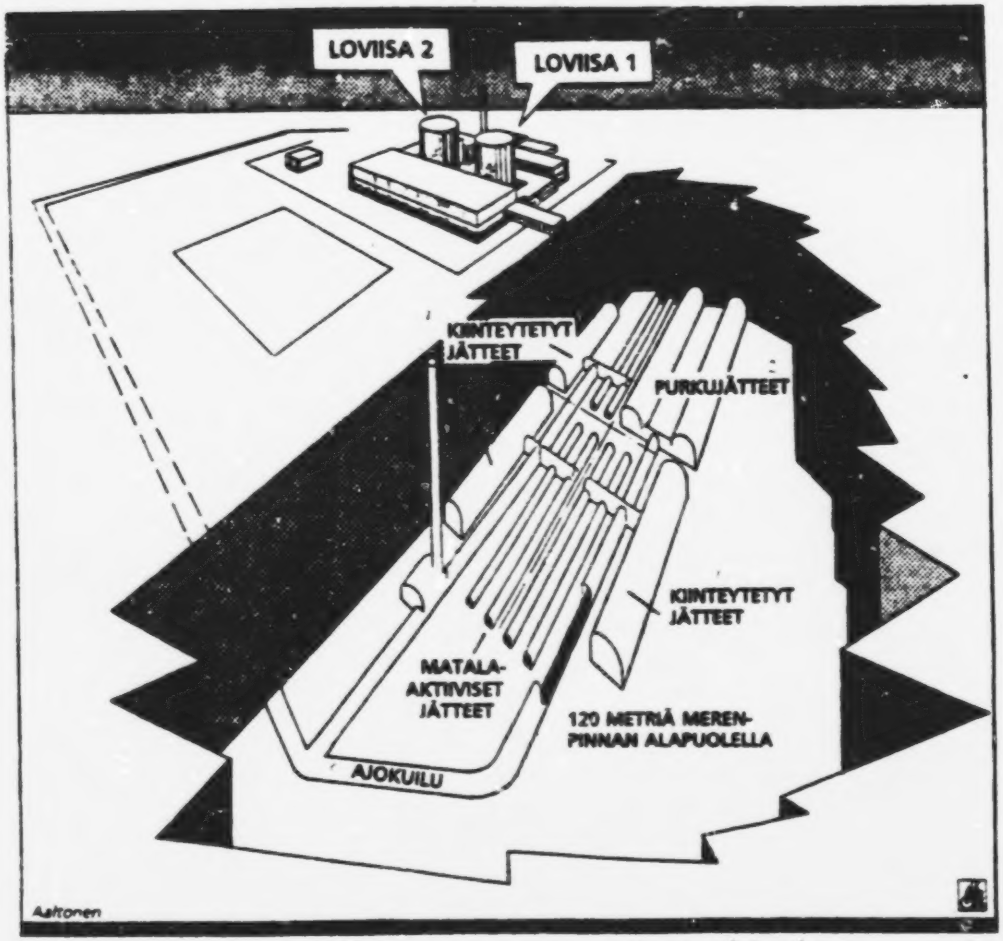
The significance of safety in the final disposal of nuclear waste is nothing compared to the risks that could occur as a result of operational disturbances, for example.



The Swedes intend to bury waste under the sea. Finnish experts believe this solution deviates from general safety thinking.

Key:

1. 6 meters of water
2. 50 meters of rock
3. Waste
4. 1,400 meters


LOVIISA 2
LOVIISA 1
KIINTEYTETYT JÄTTEET
PURKUJÄTTEET
KIINTEYTETYT JÄTTEET
MATALA-AKTIIVISET JÄTTEET
120 METRIÄ MERENPINNAN ALAPUOLELLA
AJOKUILU
Aaltonen

Waste storage caves will be dug into the island's bedrock. The various types of waste will be segregated into their own sections. In the drawing the cave is drawn to a larger scale than the nuclear power plant.

Key:

1. Solidified waste
2. Discharge waste
3. Low-active waste
4. 120 meters below sea level
5. Chute

No delays in plans. A round the clock work at Hastholmen.

Jouni Konttila drills the final holes at Hastholmen.

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SPAIN

FUTURE ENERGY SOURCES TO INCLUDE LARGER NUCLEAR COMPONENT

Madrid LUZ Y FUERZA in Spanish Jan-Feb 81 pp 45-53

[Article by Eduardo Diaz del Rio, Doctor Engineer of Roads, Canals and Ports (Spanish Atomic Forum); Vicente Gil Sordo, Engineer of Roads, Canals and Ports, and Certified in Economic Sciences (Electric Unit, SA); and Manuel Lopez Rodriguez, Doctor of Sciences (Nuclear Energy Board): "The Nuclear Electric Component in the Progress of Spanish Society"]

[Text] General Comments on the Spanish Energy System

Like other countries with a great energy dependence, Spain is an example of poor balance between the supply and demand for energy, and hence has a slight margin of flexibility. This fact necessitates making decisions aimed at reducing the dependence on foreign countries for energy.

The most prominent features of our energy system are:

a. Up until recent years, the existence of a high degree of elasticity in the energy demand with respect to the GDP.

b. An insufficient level of activity in energy exploration.

c. A heavy dependence on foreign countries for our supply, particularly that of oil, which is the main element in the lack of equilibrium in the balance of payments.

d. The level of energy prices, lower than the average for Western Europe, especially in the sectors of industry and transportation.

e. Insufficient technological development.

The government submitted to the Spanish Parliament an Energy Plan covering the next decade, which was approved by this entity in July 1979. This Energy Plan follows guidelines similar to those implemented in the OECD countries. The most significant points in this plan are:

The prices of energy and conservation measures are the key element for curbing consumption during the period covered by the plan. There is a tendency toward a system of real prices, eliminating support for certain consuming sectors.

The plan encourages an increase in the activities relating to exploration of national energy sources.

This plan is also aimed at diversifying imports of energy supplies.

A considerable percentage of the future demand for electric energy will be met through the use of nuclear powerplants. For this reason, important decisions have been offered relating to the structure of the Spanish nuclear industry and the agencies regulating it.

The investments anticipated for the first 4 years of the plan are in excess of $9.5 billion, 66 percent of which is associated with the electric subsector.

This Energy Plan intends to change the trend followed by the Spanish energy system for the past 15 years, which may be summarized as follows:

The rapid Spanish industrial development from 1964 to 1973 led to an excessive consumption of energy with respect to the amounts generated by the GDP. During that period, and in the OECD nations, the GDP increased by 4.8 percent, energy consumption, by 5.2 percent; and energy elasticity/GDP, by 1.1 percent. In Spain, those figures were 6.6, 8.9 and 1.4 percent, respectively. During recent years, the coefficient of energy elasticity/GDP has been quite variable in Spain, a behavior stemming from the energy crisis. The high figures reached by the Spanish coefficient of energy consumption elasticity/GDP must be reduced so as to approximate the figures reached by that coefficient in the OECD countries.

Spain's dependence on foreign countries for energy has increased since 1963. In that year, this dependence amounted to 38 percent; however, in 1976 the dependence on foreign countries totaled 76 percent.

Insofar as the electric sector is concerned, the most prominent features of the plans for electric energy are:

Hydroelectric energy will have to undergo a moderate increase, owing to the increasing cost of this almost marginal utilization. The increase for installing this equipment in power has proven greater than that of energy, mainly because part of that power relates to pumping facilities and over-equipping with machines to regulate production.

Coal will have to increase greatly until it meets a quarter of the total needs. This increase would come partially from brown and black lignites with a high sulfur content, which would necessitate the adoption of corrective measures to prevent the deterioration of the environment that such types of products might cause. Imported coal will be used to supplement the domestic production.

The contribution from nuclear energy must also increase rapidly, supplying 37.7 percent of the total demand by 1987. That figure represents 14.8 percent of the total consumption of primary energy.

The production of electricity using fuel oil must decline considerably, from the current 30 percent until it accounts for only 11 percent of the total electric energy required by the end of the period. The fuel oil powerplants will play a reserve role to deal with circumstances not anticipated in the exploitation programs (greater increase in demand, lag in the nuclear construction, situations involving low water supplies, etc.).

The necessary regulation of the natural gas system or the anti-pollution restrictions make it certain that, on occasion, variable amounts of natural gas will be used in certain thermal powerplants.

On the basis of the preceding comments, it may be predicted that, by the year 1990, the structure of the Spanish consumption of primary energy will be as indicated:

Year 1990	Percentage (%)
Hydroelectric	8.1
New types of energy	1.4
Coal	19.6
Fuel oil	48.4
Natural gas	6.0
Nuclear energy	16.5
Total:	100.0

In the rest of this article, we shall discuss the role that nuclear energy will play in the Spanish energy system in the future.

2. The Nuclear Powerplants in the Spanish Energy Plan

At the present time, three reactors are operating in Spain with a power of 1,120 MW. Another seven units with a power of 6,555 MW are in an advanced stage of construction. Final permits have been granted for the construction of three additional reactors with a total power of 2,950 MW. Finally, the administration has decided to propose the authorization of two more reactors with a power of 1,980 MW. This authorization will not go into effect until it has been studied by the Nuclear Safety Council, a newly created agency. Thus, by 1990 there will be a nuclear system available with a power of about 15,500 MW.

As we shall observe later, up until now the activities associated with nuclear safety have been incumbent on the Nuclear Energy Board, an agency which is also engaged in research and development areas included in the field of peaceful uses of nuclear energy. However, the tasks called for by the National Energy Plan include the creation of a Nuclear Safety Council as an independent agency concerned with nuclear safety.

3. Importance of Nuclear Energy in the Spanish Energy System

During recent years, the discussions about the future development of nuclear energy have become increasingly frequent.

In this section, an attempt has been made to evaluate to some extent the role which nuclear energy will play in Spain's energy system. This evaluation requires an analysis of the Spanish energy system over a long period of time. Because of this, the development of that system has been studied over a period of time covering the next 40 years. During this time, it will be necessary to make major decisions, such as those relating to the storage and use of burned uranium, the use of generator reactors, improvements in the efficiency and capacity of uranium enrichment processes, etc., depending on the need for such decisions.

In order to analyze the change in the role played by nuclear energy in our energy system, certain questions must be answered, such as the following:

What is the importance of the role played by energy in the growth of the Spanish economic system?

What savings of energy could be achieved if a decision is made for a complete nuclear alternative, as opposed to another based essentially on coal?

What are the uranium reserves in the world, and how are they distributed?

What is the impact of nuclear energy on the environment, and what is its importance when compared with that caused by the use of coal and other alternative sources?

Could a final solution be found to the problem of nuclear waste?

All these questions are currently being debated on an international level, and hence in Spain as well. At the present time, all nations need to find new energy sources, because the massive use of oil and natural gas is constantly reducing the resources for these fuels. The total coal and uranium resources are probably larger than those currently estimated; and after the year 2020, solar energy and that from fusion may provide almost unlimited amounts of energy. If these suppositions become a reality, the world (and hence Spain as well) will again have abundant energy; although the costs will be far greater than those to date. Therefore, the very long term energy problem is more a problem of costs and of supplies.

As has already been noted, Spain's energy resources are very slight (at present, approximately 70 percent of the total energy consumed is imported). This has caused the major problems posed to be those related to security and diversification of the energy supply, and those affecting the equilibrium in the balance of payments. For this reason, it may be claimed that nuclear energy will play a major role during the next 30 or 40 years.

In this study, an analysis is made of the impact that could be caused by a restriction on the availability of nuclear energy. Moreover, we should not forget that the security of the energy supply over the long term will probably lead to the adoption of the nuclear alternative; because this action offers advantages for the countries which depend heavily on foreign nations from an energy standpoint. One of the main advantages is that the uranium stocks are more manageable and less expensive than those associated with oil. In addition, by using regenerator reactors, it is possible to attain a high degree of independence in energy supplies.

To assess the economic impact that a restriction on the use of nuclear energy would have on the Spanish energy system, two scenarios have been studied: In the first, which we shall assume to be the Base-Case, there is a consideration of the hypotheses that are thought to be most likely concerning the evolution of prices of the various types of energy, date of availability and rate of implementation of new types of technology, technical-economic features of these new types of technology, increase in demand, etc. The second scenario, called Lim-Nuc [nuclear limitation), offers a situation with limitations on the use of nuclear energy; and the hypothesis considered is that only the units under construction or with a prior permit will be incorporated into the Spanish energy system.

Understandably, the entry of these groups has been assumed, in view of the enormous investments already made in them. So it is assumed that, after the year 2000, no further reactor, whether conventional, advanced or regenerator, will enter.

The comparison of results between these two scenarios during the time period from 1980 to 2020 has made it possible to quantify the economic impact that would occur on our energy system if we had to replace nuclear energy with more expensive types of technology.

In order to carry out this study, we used the MARKAL model which has been developed simultaneously by the Brookhaven Laboratories (U.S.) and at Juelich (Germany). Many of the features of this model come from energy models already in existence at these laboratories, such as the BESOM * and DESOM ** at Brookhaven, and the KFA Energy Supply Optimization Model *** at Juelich. However, the MARKAL model introduces major changes to meet the specific requirements of this project, carried out in the International Energy Agency. The version of the MARKAL model used was that associated with Juelich.

In the following paragraphs, there is a comparison of the most interesting results accrued in the two scenarios considered. If the Base scenario is taken as a reference point, the following comments may be made:

The structure of the consumption of primary energy undergoes major changes. Basically coal, and to a lesser extent natural gas, are the types of energy that replace the lesser contribution from nuclear energy. There is also an increase in oil consumption, but the percentage of increase is really due to the fact that, when the types of technology involving nuclear gasification of coal disappear, there is an increase in the need to import crude for the production of LPG for the residential and commercial sector. The increase in natural gas imports replaces the production of synthetic gas, also derived from nuclear gasification technologies.

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* Brookhaven Energy Systems Optimization Model (BESOM), E.A. Cherniavsky, BNL-1959, December 1974.

** "A Dynamic Time Dependent Model for the Analysis of Alternative Energy Policies", W. Marcuse et al (in : K.B. Haley, et al, Operational Research 1975, North Holland Publishing Company, 1976).

*** The KFA Energy Supply Optimization Model and Its Underlying Software Concept, Internal Paper, G. Egberts, KFA Juelich, June 1977.

On the other hand, coal imports increase drastically starting in the year 2000. In 2020, coal imports double those for the Base-Case (during the entire period, the overall increase is about 50 percent). Natural gas also increases starting in the year 1990 (approximately 900 PJ * more than in the Base-Case). However, after the year 2010, gas imports start to decline.

The structure of the final energy consumption does not vary much from one scenario to the other. The participation of liquid fuels rises slightly between 1995 and 2010 (the annual rate of increase is approximately 1.5 percent). Electricity consumption remains virtually constant, and that of renewable forms of energy shows a slight increase, only during the final years (about 10 percent). The participation of gaseous fuels in the total final energy consumption declines somewhat. From a sectorial standpoint, it may be said that in the industrial sector changes similar to those previously described for the total consumption appear: In the residential-commercial sector, there appears to be a slight decline in gas during the last 10 years of the period studied, which is offset by an increase in the use of gas heat pumps. Understandably, the transportation sector does not show any major changes between the two scenarios.

The total electricity consumption remains very similar in both scenarios, but its production structure undergoes major changes. The decline in the consumption of electricity of nuclear origin is covered chiefly by coal. For the final years, this replacement is compensated for, either by conventional coal thermal powerplants (which absorb about 80 percent of the reduction in the production of electric energy of nuclear origin), or by combined cycle powerplants (which absorb about 15 percent), and the rest (5 percent) is covered by in situ gasification and solar powerplants. The high temperature and regenerator reactors do not appear in the Lim-Nuc scenario (as has already been noted), and natural uranium is used throughout the period for each scenario.

The total production of synthetic fuels from coal is reduced to at least half of that in the Base-Case, owing to the disappearance of the technologies for coal gasification combined with the high temperature reactors. This reduction is not major, owing partly to the increased activity in the Lim-Nuc scenario of the Lurgi-Brown lignite gasification process, and the entry of a new technology, the gasification of coal to produce gas with medium heating power. Finally, methanol production hardly changes.

Finally, we shall analyze the economic repercussions which these changes cause in the Spanish energy system. Table II shows the differences in costs of extraction, importing, investment, maintenance, exploitation, transmission and distribution for the energy system in each of the two scenarios presented, and for several years of the period studied. In order to give an idea of their magnitude, the difference between the total costs of the two scenarios has been related to the estimated GDP. Although the figures will vary according to the hypotheses adopted, some very important conclusions can be drawn concerning the increase in cost over the long term that would be entailed for the Spanish economic sector by not using nuclear energy at levels higher than those established in the Lim-Nuc scenarios. For example, in Table II one notes that, from the year 2000 to 2020, the difference

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*1 PJ = 10^{15} Joules.

in cost between the two scenarios increases from 0 percent to 1 percent of the GDP (assuming approximately an average increase of 0.50 percent of the GDP per year), a figure which is really quite sizable.

Natually, this increase in the costs of the energy system has a great impact on the country's economic system. Studies made in highly developed countries (the United States, Germany, etc.) indicate that slight increases in the energy costs can be absorbed by the economic systems of those countries without causing very serious upsets. Now then, in countries which are not so developed as the ones mentioned (this applies to Spain), the impact is far greater, because these countries need to continue making considerable increases in the rate of their energy consumption. This is due to the fact that, in such countries, the rate of economic growth is still closely linked with their energy consumption, owing to the requirements for expanding their basic industry and their transportation sector. In Spain, a country with meager energy resources, the problem is even worse when one considers the equilibrium in the balance of payments. According to the Lim-Nuc scenario, Spain would have to import fuel at higher prices, which would cause major problems in the foreign trade balance.

Moreover, if all the developed countries of the International Energy Agency were to choose an alternative equivalent to the nuclear limitation (Lim-Nuc) scenario, it would cause a drastic increase in the demand for coal. Because the coal producing countries could not achieve parallel increases in the supply of their coal, there would appear a speculative coal market similar in nature to what is occurring at present with oil. Even if these developed countries were to choose scenarios equivalent to the one presented as Base * in this report, it would be necessary to develop a major infrastructure in the areas of coal production and transportation.

Finally, another aspect that should be stressed is that of security in the supply of energy. An energy shortage could bring about very serious consequences in an economic system; and hence there must be the greatest possible margin of security in the supply. As has already been stated, nuclear energy increases to a very large extent the security for supply in a country with the energy features of Spain.

Based on all the foregoing considerations, it may be claimed that the increases in energy costs in the energy alternative entailing limitations on nuclear energy would have a very heavy impact on the rest of the economic system; in other words, there would logically occur a rise in the unemployment rate, lower production, and hence a lower rate of economic growth. A quantitative evaluation of these impacts on the Spanish economic system would be very interesting; however, such an analysis transcends the goal of this report.

4. The Nuclear Fuel Cycle

The starting of the Spanish nuclear program has required the creation of an infrastructure that will guarantee the nuclear fuel factor in each phase of its cycle. The two entities responsible for this activity are the Nuclear Energy Board (JEN) and the National Uranium Enterprise (ENUSA).

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* See the results of the MARKAL project of the RD & D Committee of the International Energy Agency, January 1980.

Since its creation, JEN has been engaged in uranium prospecting and the development of the technology for the different phases of the nuclear fuel cycle. ENUSA was created in 1972, and the mission assigned it was the industrial activity and the unified management of the fuel cycle. It was subsequently entrusted with uranium prospecting outside of Spain,while JEN remained in charge of the prospecting on national territory.

The present National Energy Plan (PEN) regulates the cooperation between the two entities, JEN and ENUSA. ENUSA is responsible for the uranium prospecting both inside and outside of Spain, in addition to all the industrial activities and the management of the fuel cycle. JEN prepares the technological research and development programs which will serve as a backup for ENUSA's industrial activities. In accordance with PEN, the state will retrieve ENUSA's private capital to give to JEN. In this way, JEN will become an ENUSA stockholder.

The current status of the different phases of the fuel cycle is as follows:

Uranium Concentrates

Spain's uranium reserves amount to some 20,000 tons of U_3O_8 which could be exploited at a cost of under $30 per pound. Added to these reserves are resources amounting to 40,000 tons of U_3O_8 contained in uranium-bearing lignites, the exploitation of which poses technical problems that would increase the extracting costs to over $50 per pound.

In 1974, the government established a 10-year National Uranium Exploration Plan, run by JEN. This plan made it possible to increase the prospecting activities considerably. In addition, ENUSA is engaged in prospecting abroad (Colombia, Canada and South Africa).

At the present time, the production of uranium concentrates in Spain is about 225 tons of U_3O_8 per year, adhering to a technology totally developed by the Nuclear Energy Board. Of this number, 125 tons are produced at the plant which ENUSA owns in Ciudad Rodrigo (Salamanca), and the rest is produced by JEN at its plants in Andujar (Jaen) and Don Benito (Badajoz). The present program calls for an increase in the production of uranium concentrates to 800 tons of U_3O_8 in 1982, using a new facility to be built at Ciudad Rodrigo, and through the industrial application of a process developed by JEN for extracting uranium from phosphates.

To complete the supply to meet our needs for concentrates, ENUSA, in cooperation with the French Atomic Energy Commission and a Japanese company, Cominak, has begun exploiting uranium-bearing deposits in Niger. ENUSA has also carried out negotiations that have enabled it to sign supply contracts with Canada and South Africa. This fact insures the meeting of Spain's requirements beyond 1987.

Moreover, in June 1979 two international consortiums were formed for research on, and exploitation of uranium:

The Spanish state shares in the first of these consortiums with a participation of 40 percent, the American firm Chevron has another 40 percent, and the Spanish private enterprise "Natural Resources Promotion" has the remaining 20 percent.

The consortium will investigate the uranium resources in Catalonia and Extremadura, over an area of about 6,000 square kilometers.

The Spanish state also shares in the second consortium, with a participation of 45 percent; Exxon Mineral Spain, Inc has another 45 percent; and Mediterranean Petroleum (PETROMED) has the remaining 10 percent. This consortium will investigate two geographical areas in Castilla la Vieja and Aragon, with an initial area of some 20,000 square kilometers.

In both consortiums, the Spanish state reserves the right to purchase (at international prices) all the minerals produced. Therefore, there is no possibility of exporting minerals unless the Spanish state expressly agrees to it.

These consortiums have been promoted directly by the Spanish administration, with the twofold purpose of obtaining foreign and private Spanish financing in this sector.

Uranium Enrichment

To date, Spain has not engaged in any activity associated with uranium enrichment facilities, and hence its needs, the management of which has been assigned to ENUSA, are being met through contracts with foreign countries or participation in multinational firms. There are three sources of supply: the United States which, thus far, has met all our needs; the USSR, through two contracts with Technabexport; and, finally, Eurodif, a firm in which Spain has a participation of 11.1 percent. Between the contracts and the participation in Eurodif, the enrichment service has been assured until beyond 1987.

Manufacture of Fuel Elements

At the present time, the fuel elements used by the Spanish nuclear powerplants are being imported. However, ENUSA already has prior authorization for the construction of a factory that will make it possible to manufacture fuel elements for the light water reactors starting in 1982. The factory's capacity will amount to 300 and 600 tons of uranium by the years 1984 and 1987, respectively.

Storage and Reprocessing of Irradiated Fuel Elements

The annual production of irradiated fuel in the Spanish nuclear powerplants will increase from 20 tons in 1977 to about 300 tons in 1987, thus totaling approximately 1,500 tons of irradiated fuel during the period. To date, the irradiated fuel has been sent to France, in the case of the Vandellos powerplant, and to the United Kingdom, in the case of the Jose Cabrera and Santa Maria de Garona powerplants, for reprocessing. However, the present problems have made a new approach necessary

The reprocessing of the irradiated fuel elements to recover unburned plutonium and uranium is considered feasible. This view is based on the fact that we, like other countries, cannot dispense with the energy contained in these fuels. Everyone is aware that there are problems at present regarding nuclear proliferation. These problems must be solved, in order to guarantee the peaceful use of plutonium, to take advantage of this energy source.

Summary

In the first place, there is presented a view of the Spanish energy system, with the evolution anticipated over the next 10 years in accordance with the National Energy Plan approved by the Spanish Parliament in July 1979. In this evolution, one can observe the role that nuclear energy will play in the Spanish energy system. Also offered is a list of the nuclear powerplants which are in operation, those which are in a construction period and those with a prior permit from the administration. An analysis is also made of the economic repercussions over the long term (40 years) that would occur on the Spanish economic system by failure to use more nuclear energy than that associated with the level reached by the powerplants that are already under construction or that have a prior permit. The evaluation of these repercussions has been made by comparing two scenarios: In the first one, called Base, the most likely hypotheses are made, leaving freedom to introduce nuclear energy. The second one, called Lim-Nuc, establishes the hypothesis that there will be no building of other nuclear powerplants besides the ones already under construction or with a prior permit. This evaluation shows the sizable increase in costs that result for the energy system, and their interaction with the rest of the Spanish energy system.

The last part of the report shows a view of the current status of the different phases of the nuclear fuel cycle in Spain, as well as their future evolution, based on the implementation of the nuclear energy called for by the National Energy Plan.

Table I

Basic Hypotheses for the Base Scenario

a. General Hypotheses

Discount Rate: 6.0% per year

b. Hypotheses Regarding Resources *

Resource	Import Prices	Restrictions on the international market
Coal	Annual rate of increase for the entire period: 2%	None
Oil	Depends on the period. The average annual rate of increase is 3%	None
Natural gas	Similar to that of oil	None
Uranium	Annual rate of increase for the entire period: 3%	None

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* In the Spanish energy system, owing to the high degree of dependence, the hypothesis on international market prices has an extensive effect on the structure of the system.

c. Hypotheses Regarding Capital Costs *

Technology	Investment Costs	Comments
Coal thermal powerplant	$75 500/kW, availability factor: 65%	Fixed operation and maintenance costs: $75 17 kW/year
Conventional reactor	$75 740/kW, availability factor: 65%	Fixed operation and maintenance costs: $75 20.3 kW/year
Regenerator reactor	$75 1,100 kW, availability factor: 75%	Fixed operation and maintenance costs: $75 30.8 kW/year

Reactor in operation: 1.1 MW

Reactors under construction and with final authorization: 9.5 MW

Reactors which have only prior authorization: 4.9 MW

Total: 15.5 MW

*For the rest of the technologies, the data considered have been those used in the project on system analysis being carried out within the AIE (Research and Development Committee of AIE, January 1980).

Table II

Comparison of Costs Between Scenarios

Year		1990	2000	2010	2020
GDP Estimate (10^9 pesetas/75)		10,200.0	15,600.0	22,000.0	31,000.0
Total cost of the energy system Base Scenario	10^9 pesetas/75 % S/GDP	990.0 9.6	1,500.0 9.5	1,800.0 8.2	2,300.0 7.4
Total cost of the energy system Lim-Nuc	10^9 pesetas/75 % S/GDP	990.0 9.6	1,500.0 9.6	1,900.0 8.7	2,600.0 8.4
Increase in cost over Base Scenario	10^9 pesetas/75 % S/GDP	- -	Insignificant Insignificant	100.0 0.5	300.0 1.0

2909
CSO: 5100/2015

FIFTEEN NUCLEAR POWERPLANTS PROJECTED FOR 1980'S

Madrid LUZ Y FUERZA in Spanish Jan-Feb 81 pp 5, 7, 9, 10

[Article: "Catalonia's Great Nuclear Effort"]

[Text] The high degree of industrialization attained by Catalonia has converted it into one of the areas with the greatest demand for energy. The Catalonian firms: FECSA [Electric Power of Catalonia, Inc], ENHER [Ribagorza National Hydroelectric Enterprise], HECSA [Hydroelectric of Catalonia] and SEGRE have by now virtually constructed the economically profitable hydroelectric facilities in the area, and conventional thermal powerplants have been built to consume the large deposits of lignites and low-grade coal existing in the four Catalonian provinces, in addition to the powerplants fed with fuel oil. However, despite the high degree of electric production that Catalonia has at present, 17.8 billion kwh in 1979, the area's electric consumption in 1979 required a supplement of 2.403 billion kwh sent to it by the other Spanish provinces, thanks to the integrated transportation facilities of the Peninsular Electric System, which make it possible to transfer energy among the areas of Spain on a very stable basis.

Hence, Catalonia, which in 1979 produced on its own 17.38 percent of the electricity generated in Spain, was more or less totally aware of the need to resort to the nuclear option. Moreover, the fact that some sources of electricity are depleted, while the water resources are necessarily limited, and other sources, such as oil have become expensive to prohibitive extremes, prompted the Catalonian electric companies to give timely consideration to types of energy for substitution, as has occurred elsewhere in Spain. And among them, the one with the most immediate use and the greatest experience in the world is nuclear energy, with 30 years of on site testing of the nuclear electric facilities.

It was, in fact, a Catalonian, Juan Alegre Marcet, head of Electric Power of Catalonia and currently also president of Electric Unit, Inc, an entity which coordinates Spain's overall electric system, who remarked, concerning this nuclear option and when the sector had definitely become inclined toward nuclear energy, with the construction of three nuclear electric powerplants which went into service in 1968, 1971 and 1972, that, "The electric sector is the only one capable of making, during the next 15 or 20 years (he was speaking in 1979), the partial substitution of oil by nuclear energy in the aforementioned period of time."

Of the three nuclear powerplants generating electricity in Spain: Jose Cabrera, since 1968, Santa Maria de Garona, since 1971, and Vandellos, since 1972, one was built in Tarragona, in the heart of Catalonia. This means that the Catalonian electric companies had a clear insight into the need to resort to nuclear energy in order to maintain an effective electric service such as the one offered by the electric sector. It is well understood that Catalonia definitely needed to resort to nuclear powerplants because, as we have said, the electrical consumption of the four provinces was suffering from a major deficit in the peninsular electrical exchange. That first powerplant at Vandellos, in which the Catalonian companies participated with EDF [French Electric Power Company], was soon followed by the splendid accomplishment offered today by the four major nuclear powerplants that were built in Catalonia, not to mention a fifth powerplant also located in Vandellos which ranks in the portfolio of studies and projects capable of being achieved.

The Vandellos nuclear powerplant, Vandellos I, located 40 kilometers from the Tarragona capital, was connected to the Catalonian network on 6 May 1972, and will soon be 9 years old. It has a power of 500 kw, and was the result of Spanish-French cooperation which materialized in the Spanish-French Nuclear Energy Company, SA (HIFRENSA), with the participation of FECSA, ENHER, HECSA and SEGRE which, among the four, have a participation of 75 percent, while the French state company, French Electric Power Company (EDF), holds the remaining 25 percent of the capital.

Vandellos I generates about 3.500 billion kwh per year and, since its entry into service, has supplied the national network with some 25 billion kwh, 25 percent of which have been transferred to France through the Vich interconnection in the Pyrenees primarily. (By virtue of the agreement establishing HIFRENSA, each year it receives over 800 million kwh generated by Vandellos I.)

Naturally, the electric sector established a plan for the future in a timely manner, associated with the nuclear option; and the companies designed and built other nuclear powerplants after those opened in 1968, 1971 and 1972. There are currently seven powerplants soon to be connected with the electric network or in an advanced stage, with a combined total power of 6.555 million kw. Many of them will go into service before 1983, and some, like Almaraz I, will do so at a date very close to that of the publication of this issue of LUZ Y FUERZA. But, apart from these seven powerplants, the seven powerplans, the "magnificent seven" because they have begun a period with power amounting to over 900,000 kilowatts, there are in various stages of construction, but already given final authorization, another five powerplants, which will be completed when they receive the final authorization confirming the prior authorization given now for an additional three nuclear powerplants; thereby making a total of 15 nuclear electric powerplants under construction in Spain.

Now then, of these 15 new nuclear powerplants that Spain will have before the end of the 1980's, Catalonia designed four: Asco I and II, and Vandellos II and III. The first of them, Asco I, is being built exclusively by FECSA, with a power of 930,000 kw. It was planned to go into service by 1981, but this date will be moved ahead for reasons quite applicable to the other powerplants, all victims of administrative-political indecision and lack of understanding, which are extremely detrimental to the national electrical service. The Asco II powerplant is being built by the four Catalonian firms: FECSA and ENHER, each with a participation of 40 percent; HECSA, with 15; and SEGRE, with 0.05. Each of the groups, both Asco I and Asco II, has a capacity to produce 6 billion kwh per year. Asco II's connection with the network had been planned for 1982, but it will have to wait somewhat longer for the same reasons that are affecting all the nuclear powerplants under construction in Spain.

The final authorization recently noted for Vandellos II, a 930,000 kw powerplant in which ENHER's participation is 0.54 percent, HECSA's is 0.29 percent, SEGRE's is 0.10 percent and FECSA's is 0.08 percent, while awaiting Vandellos III, which FECSA is building exclusively on its own, completes the picture of Catalonian nuclear powerplants that are essential to meet the future consumption for a region of Spain. The rates of increase in the Catalonian demand for electricity, even while admitting a decline in the rate for the past few years, guaranteed Catalonia a doubling of the demand for electricity every 10 years, which applied until 1979.

Vandellos II and III

In 1977, the four major Catalonian firms signed the pertinent contract with the suppliers, Westinghouse and Bazan, for the construction of the second nuclear powerplant in Vandellos, adjoining the one currently in production. This new powerplant which, as we have just said, has been authorized definitively, will have a pressurized water reactor with 950,000 kw, of the same type as those installed in Asco, Almaraz and Lemoniz. The time planned for this new Vandellos powerplant to go into service has been delayed considerably, owing to the causes which have been reiterated and untiringly enumerated by the electric companies building nuclear powerplants. Vandellos produces some 6 billion kwh per year.

This Vandellos II powerplant is being constructed by the Vandellos Nuclear Association, comprised of the four Catalonian powerplants with the proportion of participation that we have noted (ENHER, 54 percent, HECSA 28, FHS 10 and FECSA 8); its engineering is being handled by the association of firms made up of the Spanish company AUXIESA and the Bechtel Power Company; and the investment planned for its construction, which has become far larger with the passage of time, is distributed as 12 percent for engineering and management, 25 percent for the turbogenerator, 25 percent for construction work, 30 percent for materials, assembly and equipment and 8 percent reserved for fuel load.

Work has been under way at Vandellos II since 1977, with prior authorization granted. Over 2,000 workers are participating in the construction, and it has been estimated that over 150,000 cubic meters of concrete, 70 kilometers of piping and 1,000 kilometers of cable will be required, as well as equipment of highly diversified origin and of various types. The weight of the containment building, including equipment, will be about 65,000 metric tons, a weight quite similar to that of a large modern aircraft carrier. The savings that the replacement of fuel with enriched uranium will represent will be about 4.5 billion pesetas per year. With new authorization, it will be followed by Vandellos III, with the same power and features as Vandellos II, designed exclusively by FECSA; and under construction at present next to the other two Vandellos powerplants are Asco I and II.

The two units comprising the Asco I and II nuclear powerplants are located in the province of Tarragona, 55 kilometers from the capital as the crow flies. The first group, Asco I, is in a very advanced stage of construction, and is the property of FECSA; the second group, Asco II, owned by ENHER, HECSA, SEGRE and FECSA, is also in an advanced phase of construction and, although it cannot be connected with the network by the anticipated time, 1981-82, it is expected to be able to do so in 1982-83, if the political-labor factors stop hampering its construction. Each of the powerplants occupies floorspace measuring about 200 by 150 meters, where most of the main construction is located, such as the reactor building, and those for control, fuel, turbine, etc.

Each group consists of a pressurized water type reactor (PWR), with a gross power of 930 MWe, and the cooling is carried out with water from the Ebro River, using supplementary cooling and discharge towers.

Upon the start of the construction, the budget of both Asco groups amounted to about 60 billion pesetas, although the final cost of the project, burdened by factors beyond the control of the firms, will total considerably more. In any event, once the two Asco facilities, I and II, are in operation, they will provide the network with 12 billion kwh per year, which is more than a tenth of the production accrued by the electric sector in 1980.

The two fundamental systems of both groups are basically the steam generation nuclear system and the electric generation system. The first, generally known as NSSS, consists of a pressurized water reactor, a reactor cooling system and the associated auxiliary systems. The reactor cooling system is comprised of three closed loops connected in parallel fashion with the reactor vessel, each having a reactor cooling pump and a steam generator; and connected to one of the loops is an electrically heated pressurizer. The second fundamental system of the powerplant, the electrical energy generating system, is made up essentially of the turbine, the generator, the condenser and the heating circuits of the feed water condenser.

One of the main features of Asco I and Asco II is the cooling. The water for the cold source of the cooling is taken by Asco from the Ebro River and, after circulating in the condensers, is taken directly through cooling towers to a mixing pool, from which it can be returned to the river or recirculated to the condenser. This water for cooling does not come in contact with the core of the reactor, but is insulated from it by two consecutive insulated circuits, the secondary circuit and the primary circuit. Part of the water from the river is used to cool various components of the powerplant, but in any case it is separated from potential contaminated elements by at least two consecutive closed circuits.

The concession of water for cooling at the Asco Nuclear Powerplant was made by the General Directorate of Water Works on 28 June 1977, and includes 33 conditions imposed by highly restrictive clauses, in order to guarantee the absence of harmful effects on the river, both with regard to the thermal and the radioactive aspects.

The maximum increase in temperature acceptable in the waters of the river will be 3 degrees centigrade, in any case, gaged by the difference between the temperature that exists in the water circulating through the intake conduit at a depth of 1 meter, as a minimum, and the maximum temperature of the water in the river bed in a section located beneath the spilling point at which the atomic dispersion might be considered checked.

A continuous temperature control system, which includes the intake, discharge conduit and point at which the dispersion is checked,will make it possible to oversee compliance with the regulations.

The cooling towers will divert part of the heat into the atmosphere, to limit the increase in heat in the river to the amounts stipulated in the concession. The system is designed to operate using different methods, depending on the river bed and the power produced by the plant. For river volumes of flow exceeding 288 cubic meters per second, there is in effect the condition of 3 degrees centigrade without a need for the cooling towers, something that will occur two thirds of the year, according to the experience gained over the past 10 years. For volumes of flow less than 288 cubic meters per second, the cooling towers would be put into operation.

If it should prove necessary, for lower volumes of flow, there is a possibility of increasing the runoff discharged from the towers by recirculating part of the water. The very restriction of the increase in temperature to 3 degrees centigrade necessitated the construction of the cooling towers which, with their associated construction, entailed an additional investment of 700 million pesetas.

Report on the Safety of the Asco Nuclear Powerplant

The Joint Commission of the Generalitat and Mayors of the Municipalities of the Asco area has disseminated a memorandum on the activities carried out by it to date. As may be recalled, on 8 July of this year a Joint Commission of the Generalitat and Town Halls of the Asco area was set up to find solutions and to oversee compliance with conditions relating to the Asco nuclear powerplant. The Joint Commission consists of the mayors of the leading localities of the Asco-Asco area, and the l'Espanyol, Flix and Vinebre country estate, as well as the head of the Inter-District Council of Ebro Land, and the general directors of the departments of industry and energy, agriculture, government, health and social security, and policy and public works of the Generalitat. The representatives of the Generalitat, as stated verbatim in the memorandum, "act on the basis of a moral imperative, with responsibility freely assumed with respect to the population concerned."

Since the day of its founding, the commission has held six meetings, and the topics primarily discussed were the following: urban development and siting, quality control, level of radioactivity in the vicinity of the powerplant, cooling water intake, impact on agriculture and a general consideration of the group of legal measures and provisions to be taken into account. Owing to factors related to urgency and operations, the joint commission decided to focus on matters involving Asco I, and later proceed to study group II of the same powerplant.

The issues which have most concerned the local mayors have been concentrated on whether or not there is an emergency plan in the event of an accident, and also on whether there is any nuclear risk insurance now that the nuclear fuel has been stored. The firm responsible for the Asco I nuclear powerplant has answered these questions stating that an internal emergency plan for the powerplant has been completed, and that the insurance for civil liability assigned to third parties for nuclear fuel storage has also been provided for, in accordance with the legislation currently in effect.

The joint commission considered the emergency plan for the civilian population devised by the company to be inadequate, and therefore contacted the latter, which expressed complete willingness to prepare a new proposal for an emergency plan involving the areas contingent upon it, and to cooperate unconditionally in the areas which are not within its jurisdiction. With regard to this same issue, the joint commission made an inquiry of the Nuclear Energy Board, which was answered verbally by its head, to the effect that, "The level of risk from the storage of nuclear fuel does not necessitate the existence of an emergency plan," according to the memorandum from the joint commission.

As for the topics of urban development and siting, the joint commission expressed the opinion that, at the time, the Town Hall had acted properly and in accordance with its authority and the legislation currently in effect. The issue stands as follows at the present time: The owners of the powerplant resorted to an administrative suit, wherein the decision was in their favor; and the Town Hall, in turn, brought the matter before the Supreme Court, which has not yet decided on the case. The commission has requested the pertinent report on the legal situation that could occur in the event that the permit for operating the powerplant were to be granted for its entry into service before the Supreme Court had decided on the urban development issue.

With regard to the foundation of the Asco I nuclear powerplant, the commission has studied various reports that do not indicate any rational sign of problems with it. As for quality control, the joint commission has requested of the plant owners a report on its current status, as well as an index of documentation produced and transmitted to the Nuclear Energy Board, documentation which has by now been submitted and is being studied at the present time.

Nuclear Powerplants Under Construction (prior authorization and authorization for construction granted, as noted in the National Energy Plan)

Powerplant	Owners	Standard Power (MW)	Date of Entry Into Service
Almaraz I	1/3 H. Espanola 1/3 Cia Sevillana 1/3 Union Electrica	930	1978/79
Almaraz II	1/3 H. Espanola 1/3 Cia Sevillana 1/3 Union Electrica	930	1979/80
Lemoniz I	Iberduero	930	1979/80
Asco I	FECSA	930	1980/81
Lemoniz II	Iberduero	930	1981/82
Asco II	0.4 FECSA 0.4 ENHER 0.15 HECSA 0.05 SEGRE	930	1981/82

Powerplant	Owners	Standard Power (MW)	Date of Entry Into Service
Cofrentes	H. Espanola	975	1982/83
Total Power:		6,555	

Nuclear Powerplants With Prior Authorization Granted

Powerplant	Owners	Standard Power (MW)
Vandellos II	0.08 FECSA 0.54 ENHER 0.28 HECSA 0.10 SEGRE	950
Valdecaballeros I	1/2 H. Espanola 1/2 Cia Sevillana	975
Trillo I	0.6 Union Electrica 0.2 ERZ 0.2 Eiasa	1,032
Sayago	Iberduero	1,070
Valdecaballeros II	1/2 H. Espanola 1/2 Cia Sevillana	975
Regodola	0.6 Fenosa 0.2 H. Cantabrico 0.2 E. Viesgo	930
Vandellos III	FECSA	950
Trillo II	0.6 Union Electrica 0.2 ERZ 0.2 Eiasa	1,032

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END

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12 November 1981

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 122

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12 November 1981

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 122

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KAMBALDA SITE PROPOSED FOR RADIOACTIVE WASTE STORAGE

Shipment From Singapore

Perth THE WEST AUSTRALIAN in English 8 Sep 81 p 5

[Text]

About 100 drums of radioactive waste will be shipped to WA from Singapore to be stored in a brick shed on Western Mining Corporation land at Kambalda.

The general manager of the nickel division of WMC, Mr B. J. Hurley, said that there would be no danger from the waste while it was in storage.

The 15m by 10m brick shed had been built to specifications set by the Radiological Council of WA.

It was in a salvage yard near a heavy industrial area and was surrounded by a wire fence for additional security.

The waste had not yet been returned from National Iron and Steel Mills in Singapore. He did not know when it would be returned.

The waste is believed to have become contaminated after a radioactive measuring gauge from WMC's Kambalda site was accidentally included in a shipment of scrap metal to Singapore.

Protest Strike

Canberra THE WEEKEND AUSTRALIAN in English 12-13 Sep 81 p 3

[Article by Steve Harvey: "Radioactive Waste Row Halts Mine"]

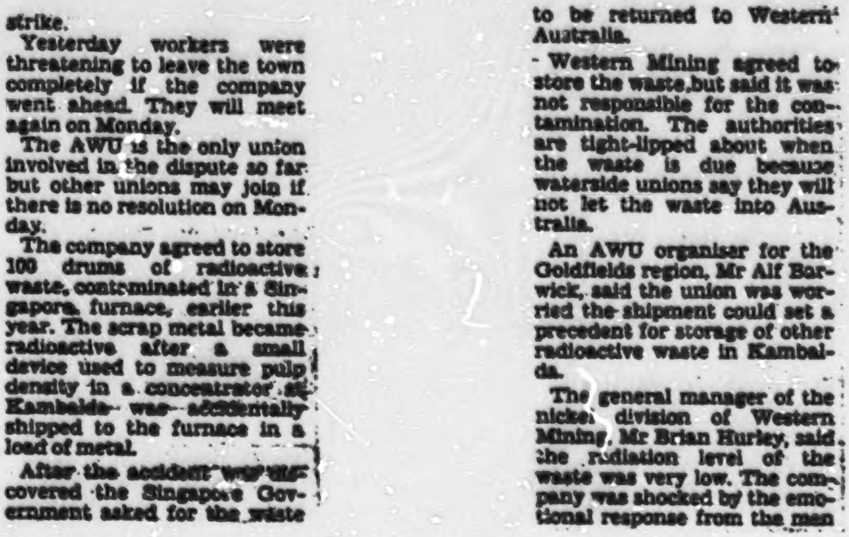
[Text]

AUSTRALIA'S biggest nickel mine at Kambalda in the Eastern Goldfields of Western Australia is at a standstill because of a plan to store radioactive waste less than 100m from a residential part of the town.

More than 600 members of the Australian Workers Union employed by Western Mining Corporation walked off the job late on Wednesday after the news leaked that the company planned to store the waste in a special building in a light industrial complex on Kambalda's outskirts.

The union is worried the town could become a nuclear dumping ground.

Negotiations between AWU organisers and the company in Perth on Wednesday failed to find a solution and a mass meeting of AWU members yesterday failed to end the



strike.

Yesterday workers were threatening to leave the town completely if the company went ahead. They will meet again on Monday.

The AWU is the only union involved in the dispute so far but other unions may join if there is no resolution on Monday.

The company agreed to store 100 drums of radioactive waste, contaminated in a Singapore furnace, earlier this year. The scrap metal became radioactive after a small device used to measure pulp density in a concentrator at Kambalda was accidentally shipped to the furnace in a load of metal.

After the accident was discovered the Singapore Government asked for the waste to be returned to Western Australia.

Western Mining agreed to store the waste, but said it was not responsible for the contamination. The authorities are tight-lipped about when the waste is due because waterside unions say they will not let the waste into Australia.

An AWU organiser for the Goldfields region, Mr Alf Borwick, said the union was worried the shipment could set a precedent for storage of other radioactive waste in Kambalda.

The general manager of the nickel division of Western Mining, Mr Brian Hurley, said the radiation level of the waste was very low. The company was shocked by the emotional response from the men

Compromise With Workers

Perth THE WEST AUSTRALIAN in English 15 Sep 81 p 3

[Excerpts] Kambalda: Workers here voted to return to work yesterday after reaching a compromise with Western Mining Corporation over the storing of radioactive waste.

The workers, who last week went on strike until they received an assurance from the company that the waste would not be stored in the town, agreed to a proposal to have it buried between eight and 30 kilometres out of the town.

The suggestion came from a radiation specialist, Mr David Woods, who flew over from the Atomic Energy Commission in Sydney during the weekend.

Mr Woods addressed about 2000 unionists and their families at a public meeting yesterday morning and told them that the radiation in the wastes was of a very small level and could not be considered dangerous if the precautions he recommended were taken.

110 Drums

The waste, consisting of 110 drums of furnace lining, 4500 litres of sludge from a scrubber unit and a solid mass of steel weighing 10 tonnes, was accidentally contaminated in Singapore three years ago when a radioactive measuring device was put in the furnace with the scrap metal.

Mr Woods said that the material should be buried in a pit between eight and 30 kilometres from Kambalda. A concrete slab should then be poured over it to foil vandals.

Soil Cover

A soil cover of at least half a metre should be placed on the concrete. This would effectively prevent any radiation leak from the waste.

Western Mining agreed to this proposal.

The unionists at the meeting expressed fears that measuring devices similar to the one that contaminated the metal could affect workers in the plant at Kambalda.

Mr Woods said that such devices were only dangerous during maintenance work when their cast-iron shields were removed.

CSO: 5100/7502

ACTU CRITICIZES STATE SUBSIDIES FOR NUCLEAR INDUSTRY

Canberra THE AUSTRALIAN in English 15 Sep 81 p 17

[Article by Nicholas Rothwell: "Uranium Subsidies 'Poor Spending of Tax Dollars'"]

[Text]

GOVERNMENT subsidies for the Australian nuclear industry were bolstering "massive private investments" and preventing proper spending of taxpayers' money, the ACTU claimed yesterday.

The latest ACTU attack on the Federal Government's uranium policy claims investment by government, industry and foreign business in the uranium industry will have an overall detrimental effect on the Australian economy.

The ACTU policy, reaffirmed in its new position paper, "Australia's Uranium Industry — Heading for Economic Catastrophe", calls for bans on the mining and export of uranium.

The paper, which will be sent to all affiliates of the ACTU, says Commonwealth subsidies for "uranium and nuclear matters" last year were $50.4 million and far exceeded spending on solar energy and conservation projects.

"The only special tax applying to the uranium industry is designed to compensate for environmental spending, and will raise no more than $500,000 from Ranger and Nabarlek at peak production," the paper says.

But Government spending on environmental measures in the Alligator River region alone had cost $6.9 million last year.

"This enormous subsidy to an industry which is lurching towards collapse is a poor investment of the taxpayers' dollars," the paper says.

Recent estimates had shown that despite subsidies to the American nuclear power generation system, nuclear energy was the most expensive form of power supply devised.

The job-intensive Australian manufacturing industry was being pushed aside by the capital-intensive mining industry in the scramble for investment dollars.

Only 250 permanent jobs had been created at Ranger and the investment rate for each of these was $500,000, but the manufacturing industry could create jobs at a rate of investment many times lower.

"Heavy investment in mining means demand for hard-to-find investment capital is pushing interest rates higher, so investment in job-intensive manufacturing industry is expensive and slow," the ACTU claims.

The result was fewer job opportunities and as governments around the world had come to recognise the "cold facts" about the nuclear industry, demand for uranium had fallen drastically.

These facts included "inefficiency, danger, crippling capital costs and public opposition".

A survey by the energy laboratory of the Massachusetts Institute of Technology (MIT) had concluded stockpiles of uranium held by nuclear nations would be released to the world market.

The ACTU says this development will stop further purchase of uranium fuel by the nuclear power nations and producer countries will not make significant commitments for exports for deliveries much before "the end of the decade".

"The drunken dreams of five years ago, with their dazzling pictures of a uranium bonanza, have now vanished," the paper says.

The price of uranium had fallen and would fall further and there was no certainty Australian uranium could be sold at all, even at reduced prices.

The MIT report had referred to "Australia's relatively weak position" as a producer before the slump in demand.

"We can expect the big investors to move on in good time, or appeal for help to their sympathetic friends in government, but meanwhile workers will have uprooted themselves and their families to travel to remote locations with dangerous working conditions," the ACTU report says.

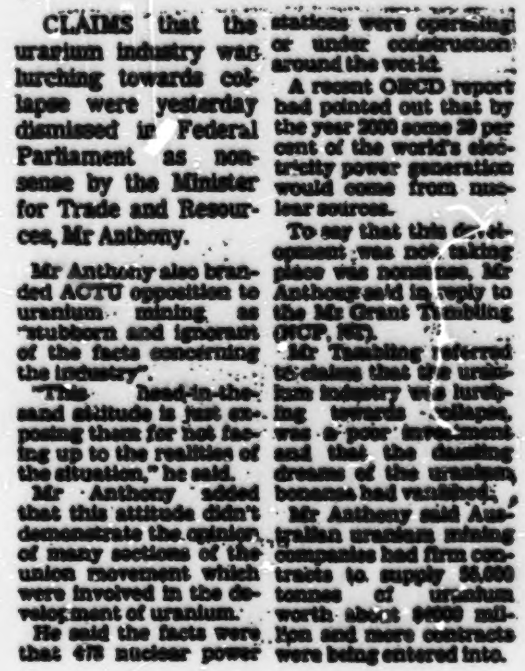
CSO: 5100/7502

AUSTRALIA

ANTHONY RAPS ACTU OPPOSITION, CALLS URANIUM INDUSTRY HEALTHY

Canberra THE AUSTRALIAN in English 16 Sep 81 p 4

[Text]



CLAIMS that the uranium industry was lurching towards collapse were yesterday dismissed in Federal Parliament as nonsense by the Minister for Trade and Resources, Mr Anthony.

Mr Anthony also branded ACTU opposition to uranium mining as "stubborn and ignorant of the facts concerning the industry".

"This head-in-the-sand attitude is just exposing them for not facing up to the realities of the situation," he said.

Mr Anthony added that this attitude didn't demonstrate the opinion of many sections of the union movement which were involved in the development of uranium.

He said the facts were that 478 nuclear power stations were operating or under construction around the world.

A recent OECD report had pointed out that by the year 2000 some 20 per cent of the world's electricity power generation would come from nuclear sources.

To say that this development was not taking place was nonsense, Mr Anthony said in reply to the Mr Grant Tambling (NCP, NT).

Mr Tambling referred to claims that the uranium industry was lurching towards collapse, was a poor investment and that the dazzling dreams of the uranium bonanza had vanished.

Mr Anthony said Australian uranium mining companies had firm contracts to supply 58,000 tonnes of uranium worth about $4000 million and more contracts were being entered into.

CSO; 5100/7502

BRIEFS

BEEF RADIOACTIVITY CHARGE--Canberra--A Queensland Labor Senator claimed yesterday Australia could be exporting radioactive beef to America unless there were stricter safeguards at the French-owned Ben Lomond uranium mine near Charters Towers. In his maiden Senate speech Senator Jones said uranium ore storage tanks at Ben Lomond last January had been fractured and was flooded during the annual northern downpour, causing an overflow of contaminated water into a nearby creek. "Tests by the Queensland Water Control Council on seepage from the ore stockpile showed radiation of more than 120 times the acceptable level," he said. "The rural press has played down the effects of the spill, despite 60 cattle properties and 6000 cattle lining the watercourse. Export and domestic beef, as well as milk supplies, could conceivably be contaminated in the event of any future radiation leakages. The effects of this could be far more devastating than any scandal so far. Water is a very contentious issue in the area. Pumps feeding Charters Towers luckily broke down at the time, forcing locals to rely on rainwater. If the pumps had not broken down, there could have been a disaster." Senator Jones called for safety standards to be investigated at Ben Lomond before the next wet season in a few months. [Text] [Brisbane THE COURIER-MAIL in English 17 Sep 81 p 3]

CSO: 5100/7502

MP'S CONDEMN U.S. DECISION ON NEUTRON BOMB

New Delhi PATRIOT in English 22 Sep 81 p 8

[Text]

TWO hundred and ten members of Parliament representing the entire spectrum of political opinion in the country on Monday condemned the US decision to go in for the neutron bomb, reports PTI.

In a statement, the MPs—drawn from 18 national and regional parties and independents — said: "we strongly protest the decision by the Reagan administration to produce the neutron bomb which brings the world closer to a nuclear holocaust".

They called upon the United States to "halt the production of this inhuman weapon and to enter into immediate negotiations for banning all nuclear weapons for disarmament and world peace".

In another statement, the MPs emphatically condemned the invasion of Angola by the racist troops of the South African Government, threatening the freedom of a peace-loving nonaligned State and endangering world peace.

We demand the immediate withdrawal of the South African troops and demand that the UN must enforce manratory sanctions against South Africa, the statement said.

The statements were signed by Cong-I members including Dr Shankar Dayal Sharma, Ram Niwas Mirdha, Nawal Kishore Sharma, Eduardo Faleiro, Jagdish Tytler, Chintamani Jena, K Lakkappa, Nihal Singh, Mohsina Kidwai, Abida Ahmed, Uttam Rao Patil and Kusuma Krishnamurthy.

Among others who also signed the statements were Bhola Paswan Shastri and P Unnikrishnan of the Cong-S, Samar Mukherjee and Niren Ghosh of the CPI-M, Indrajit Gupta, and Yogendra Sharma of the CPI, Ram Vilas Paswan and N P Shahi of the Lok Dal, Madhu Dandavate and H K Mallick of the Janata Party, Satish Aggarwal and Hari Shanker Bhabhra of the BJP, Tridib Chaudhuri of RSP, Harikesh Bahadur of the DSP, Chitta Basu of Forward Bloc, Chandrajit Yadav of the Janwadi Party, Sathiavani Muthu, AIADMK and C T Dandapani of the DMK.

CSO: 5100/7004

DELHI'S ASSERTIONS ON TARAPUR ANALYZED

Calcutta THE STATESMAN in English 23 Sep 81 pp 1, 9

[Text] NEW DELHI, Sept. 22.—The Government's answers to questions on the Tarapur atomic power plant during the just-ended Parliament session were notable for their disclosure that the Indo-U.S. talks on resumption of nuclear fuel supplies to Tarapur had in effect failed, and their confident assertion that the plant would nevertheless be kept going.

In the somewhat excessively cautious official briefing at the end of the July talks here between the two countries on this subject, there had been no clear indication as to the fate of those talks.

Even the first round of talks in Washington in April had been described at that time, officially, as little more than preliminary in nature

In the monsoon session of Parliament, however, the Government was refreshingly open about the matter.

The Government told the Lok Sabha that "during the last round of Indo-U.S. talks on Tarapur held in New Delhi in July, the U.S. side once again indicated, as it had in April, that it was not in a position to continue the nuclear supply relationship"

In other words, the bilateral agreement is destined to be terminated and all that remains is a discussion of the modalities of such termination.

This should end confused speculation on the subject.

On alternative fuel, again, there has been similar openness. In May, during the Budget session, the Prime Minister told the Rajya Sabha in a written reply that work on a feasible alternative to enriched uranium was in progress, "but it is not advisable to spell out details".

In the just-concluded session however the answer given to a question on the subject of alternate fuel was the confident assertion that "the Government of India is prepared with alternative measures to ensure continued operation of the Tarapur atomic power station"

In a variation of that reply, other questioners were told that "the Tarapur plant will be kept working with alternative means irrespective of further fuel supplies from the USA".

The answers suggested also that mixed oxide fuel was the alternative. "Development work on indigenous mixed oxide fuel for the Tarapur plant has been carried out and found feasible", the Government told the Rajya Sabha on August 20.

On the question of the plant to reprocess spent fuel at Tarapur, there remains some confusion.

The Government told questioners that owing to the reluctance of the U.S. Government to complete the "joint determination" regarding the "safeguardability" of the reprocessing plant, reprocessing of the spent fuel had been delayed. That delay had forced the Government to carry out extensive modifications to augment the storage facility at avoidable expense and effort.

This is in conflict with earlier reports that in September last year the International Atomic Energy Agency, to which the application of the "safeguards" part of the Tarapur agreement had been entrusted, had examined the design details of the reprocessing plant at Tarapur and had come to the conclusion that safeguards could be satisfactorily implemented when the plant reprocessed power reactor fuel. In fact, the chairman of the Atomic Energy Commission, Mr H. N. Sethna, was then quoted as having said that "the subsidiary arrangements have come into effect and now we are ready to commence reprocessing of power reactor fuel".

Incidentally, in answer to a specific question in the Rajya Sabha as to what decision had been taken to reprocess the spent fuel stockpiled at Tarapur, the Prime Minister said last Thursday: "No decision has been taken yet".

The session was notable also for questions on whether India had approached other countries, such as France and Canada, for supply of enriched uranium for Tarapur. Members were told that India had not made any such approach. On the contrary, an offer of supply of enriched uranium "was mentioned by the then Soviet Premier, the late Mr Kosygin, during his visit to India in March 1979, but in view of the existing agreement with the USA, the matter was not pursued".

The Government disclosed during the session that against the 14,800 kg of U-235 to be supplied by the USA during the 30-year period of the 1963 agreement, only 3,923 kg had so far been received. The actual uranium hexaflouride content of the supplies so far was only 253.4 tonnes.

Parliament was also told that no more fresh enriched uranium of U.S. origin was available now at the nuclear fuel complex at Hyderabad, and that hereafter only processing of scrap would be carried out. The enriched uranium section of the fabrication plant was already working at low capacity and was likely to close down "in the event of non-receipt of further supply of enriched uranium".

CSO: 5100/7007

AEC CHAIRMAN ON PEACEFUL USES OF NUCLEAR ENERGY

Lahore THE PAKISTAN TIMES in English 8 Oct 81 p 10

[Text]

RAWALPINDI, Oct. 7: The Chairman of the Pakistan Atomic Energy Commission, Dr. Munir Ahmad Khan, said Pakistan would continue its efforts to acquire nuclear energy for peaceful purposes.

In an interview with an Urdu magazine, he said it was the basic right of Pakistan to acquire energy for development, and added, "we are conducting our nuclear programme on our own resources. PAEC, he said, had evolved different varieties of wheat, cotton and rice which could greatly increase agricultural production. Agricultural produce could also be preserved for a longer period with the help of nuclear energy.

The Chairman said PAEC had also prepared a grass which, besides being used as fertiliser and fodder for cattle, could make the barren lands fertile. The commission was helping several hospitals in treatment of cancer.

He said top priority be given to establishing a solid and large technological base without which no development could take place nor would the country absorb modern technology from abroad.

He said Sweden and Japan had proved that nuclear energy could greatly benefit development projects in many fields for the welfare of people.

Dr. Khan said sound education and skilled manpower were prerequisites for a strong technological base. He regretted that the standard of education was deplorable and research was not being conducted at the universities. Men of international repute were rarely produced by the Pakistani universities, he said.

After raising the standard of education a science policy should be prepared giving top priority to agriculture, natural resources and electronics.

He said the centre of nuclear studies had produced brilliant technologists who could greatly ocntribute to development of the country.—APP

CSO: 5100/4503

INDIAN EXPERT SPECULATES ON NUCLEAR CAPABILITY

New Delhi PATRIOT in English 16 Sep 81 p 2

[Text] US Assistant Secretary of State James Buckley has recently lent fresh vigour to the issue of sales of the F-16 'Falcon' aircraft to Pakistan. His statement in Bangkok comes close on the heels of statements by Pakistan's Foreign Minister Aga Shahi at seminars in Lahore and Karachi. Shahi's statements sometimes gave the impression that the United States was dragging its feet on the F-16 commitment made by Buckley in Islamabad last June.

It was Buckley's visit to Pakistan which created a furore in India, coming as it did while Mr P V Narasimha Rao was in that country. The furore arose because the F-16 represents a level of sophistication which, India feels, would pose a grave threat to its national security. Also, the audacious use to which Israel put it in Iraq conjured the worst of scenarios. Exactly how many F-16s, and over what time frame, would be delivered to Pakistan remain a mystery. Although a Pakistani military delegation visited Washington and examined the F-16s, the basis of sale, whether cash or military credit, has still to be ironed out.

Aga Shahi has made it clear that no undertaking has been given about Pakistani renunciation of nuclear explosions. There is the Symington-Glenn Amendment to the US Foreign Assistance Act that forbids US economic or military credit to any country engaging in the manufacture of nuclear weapons through enrichment (Symington) or reprocessing technology (Glenn), but it does not forbid cash sales.

In the case of Pakistan, President Carter had used the Symington provisions of the Act to cut off economic aid worth 40 million dollars, when it was discovered in April 1979 that at Kahuta, near Islamabad, an unsafeguarded enrichment plant was under construction. In May 1979, the then Assistant Secretary of State [illegible] Pickering went on record [illegible]ng a US Senate hearing, stating that at the Pakistan Institute of Nuclear Science and Technology (PINSTECH) at Nilore, near Islamabad, there was also in existence a pilot reprocessing plant, unsafeguarded and one-tenth the size of the one the French had contracted to build at Chasma barrage in 1976. The President of the French company, Saint Gobain Techniques Nouvelles, stated that 95 per cent of the vital equipment had been transferred and the remaining five per cent was unimportant. However, President Zia-ul-Haq, in an interview in 1979, claimed that the vital five per cent had been withheld.

To this day, the exact modus operandi which Pakistan will adopt for its bomb remains unclear. Irrespective of that, one must also stress at this stage that the linkage that the United States had sought in the past between supplies of military hardware and abnegation of the nuclear option is at present being also attempted in the case of Pakistan. How far it will succeed is anybody's guess, especially in the light of Aga Shahi's remonstrations to the contrary.

Regarding Pakistan's enrichment project at Kahuta, Islamabad has consistently claimed that it was for purely peaceful purposes and aimed at eventual fuelling of the 600 MW Chasma Nuclear Power Plant (CHASNUPP). If one were to grant this, then one also has to think of its precursor, a pilot plant that could produce small quantities of highly enriched uranium (HEU). Simon Henderson, correspondent of the Financial Times of London who was stationed in Pakistan in 1978, brought to light the existence of a pilot plant at Sihala, southwest of Islamabad.

Enrichment technology has several facets; the fluorine plant (or 'hex') is a crucial component. In the 'hex', uranium present in yellowcake is in the intermediate stage converted into uranium tetrafluoride (UF4) and finally into uranium hexafluoride (UF6). The latter is very volatile and hence is circulated as gas in the centrifuges which spin at twice the speed of sound to swirl and separate the weapons grade U-235 from U-238 in the gas.

The West German magazine, Stern, on 25 June this year made the revelation that Pakistan had signed a contract with a German firm named CES Kalthoff in Freiburg as early as March 1977 for the supply of components needed for a fluorine plant. It also mentioned the existence of a pilot plant in Multan which began operations in 1980. Since Multan is 320 km from Kahuta, the prospect of pumping UF4 or UF6 as gas 320 km to the centrifuges at Kahuta or Sihala with grave security problems leads one to conclude that the Sihala plant might have been shifted to Multan. Nuclear physicists tell us that a 90 MW to 100 MW plant operating for one year can produce out of 8,000 kilograms (or 8 tonnes) of natural uranium hexafluoride, one uranium bomb (which requires a minimum of 15 kilograms of HEU).

One advantage of the centrifuge technique is that the drums that rotate can be added on as and when they are available. As a result, the process can go on in stages. The drums are made of hardened steel known as martensitic steel. The Director of the Pakistan Enrichment Project is Dr Abdul Qadir Khan, a metallurgist who is believed to have procured 6,200 martensitic age-hardened steel tubes. It is not clear how many drums can be produced from these tubes. An enquiry conducted by the Swiss government revealed that Vakuum Apparate Technik (VAT) in Haag, Switzerland, had in the past supplied vacuum related high precision equipment to Rawalpindi. Another Swiss Engineering firm, KORA, had been supplying evaporators and condensers, which are vital for operation of a hexafluoride plant. The KORA facility was the target of a bomb attack on 20 March this year and in all probability Israel's secret service, MOSSAD, was involved.

Given all these facts, how can one dismiss the possibility that Pakistan has a nascent nuclear weapons capability? President Carter tried to halt this capability in early 1979, but his determination wilted before the end of that year following developments in Afghanistan. His successor, Ronald Reagan, who de-emphasised non-proliferation in his early months at the White House, backtracked and on 11 July this year announced a new non-proliferation policy. In the case of Pakistan, the favoured strategy is one of a trade-off of sophisticated military hardware against the Pakistani nuclear thirst, to use Secretary of State Alexander Haig's terminology.

It is difficult to see the strategy succeeding because the United States too has expectations from Zia-ul-Haq, especially in regard to the possible use of the Gwador base for its Rapid Deployment Force (RDF) activity. Buckley's feeble attempts in the US Senate and in a letter to the Editor of the New York Times to draw a distinction between explosion of a peaceful nuclear device and of a nuclear weapon only show Washington's inability to influence the course of Pakistan's nuclear weapons programme.

When the pro-Zia newspaper, Nawa-e-Waqt, screamed in its headline on 5 July that the F-16s bring within their range targets such as Tarapur, Trombay and Kota, the worst of fears were aroused in India. One must, however, caution here that it is a long way from a nuclear explosion to the warhead that will be carried on the pylons of the F-16s. Also, the delivery date of the F-16s is yet to be decided by the US legislative process. Whether the US Senate and the House of Representatives will annul the Symington-Glenn Amendment before the end of this year one cannot say. But it does not seem likely that the process will allow military credits before October 1982, which coincides with the end of the next US fiscal year. Aga Shahi has often enough mentioned help from a friendly Islamic country, a reference to Saudi Arabia. As pointed out earlier, cash sales are not prohibited by the Amendment. If cash is forthcoming, Pakistan can immediately purchase F-16s from General Dynamics in the US. How many will depend on the cash available.

A word is in order for India's options. It is possible that the country will opt for a large number of squadrons of the Soviet MiG-25 interceptor version coupled with the Soviet Tu-126 AWACs. There are reports about the Tornado, a British DPSA (deep penetration strike aircraft), but whether foreign exchange stringencies will allow for that is anybody's guess.

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CSO: 5100/7006

PROGRESS OF TANDAR PROJECT DETAILED

Buenos Aires ESTO ES in Spanish Aug 81 pp 8-13

[Article by Omar Bernaola; part of the information contained in this paper was taken from a report published by the journal INTERCIENCIA (6, 93, 1981)]

[Text] The TANDAR [Argentine Tandem] project is one of the greatest efforts made by Argentina to strengthen its basic research program; it poses a real challenge to the CNEA's [National Atomic Energy Commission] physics department, because once it is completed, it will operate in permanent communication with its main counterparts in the world.

At the junction of the city limits with the province of Buenos Aires, a few meters from the intersection of Constituyentes and General Paz avenues, there is a new group of buildings among the INTI [National Institute of Industrial Technology] facilities and those of the Constituyentes Atomic Center. Particularly noticeable is a large cement tower with no windows. This is the main building housing the CNEA's TANDAR project.

The TANDAR project is now well underway; it is part of a general plan to develop and improve nuclear sciences. This project in particular has called for one of the greatest efforts in basic research made throughout Argentina's history. It offers a noteworthy challenge for the future to the scientists in the CNEA's physics department.

Background of the Project

The background of the project is closely related to the historic development of the physics department, which is located at the central CNEA headquarters in the city of Buenos Aires.

The CNEA was founded in 1950, and at that time the physics department did not exist as a separate entity within the institution. Nonetheless, a large number of the scientists who joined the CNEA in 1950 and 1951 were already working in the field of nuclear sciences.

As a more suitable support structure came to be provided, the work that would later justify the creation of the physics department began to take on importance. By 1952 there was a 1.2-MV Cockroft Walton particle accelerator, but the most significant event occurred in 1954, with the inauguration of the 180-cm Philips synchrocyclotron which can accelerate deuterons up to 28 MeV and alpha particles up to 56 MeV. By that time there were also magnetic spectrometers and a Calutron, which helped to stimulate work in experimental nuclear physics. Initially, the purpose of the synchrocyclotron was to irradiate internal targets and produce radioisotopes which the scientists used to study and develop the possibility of external irradiations. In 1957 a beam extractor was obtained for research projects. This led to the discovery of a number of new nuclides and proof of the existence of the diproton.

In 1966 the IALE [Isotopes Remote from the Stability Line] project was begun, and a line isotope separator was built and put in operation. This equipment used the Cockroft Walton accelerator as a neutron generator for the fission products source.

Also in 1966, discussions began about acquiring new equipment and about expanding the infrastructure. At that time the work on the new magnetic beam extractor from the synchrocyclotron was already in progress and the physics department used this opportunity to introduce improvements in the magnetic field and the radiofrequency of the accelerator.

In 1970 it was proposed to convert the synchrocyclotron into an isochronic cyclotron, but the project did not become a reality. However, these ideas were being discussed in a similar way at the Apache Project in Oak Ridge in the United States. This led the nuclear physics group to present a feasibility study in 1975 about the acquisition of a Tandem type accelerator.

In the meantime, the physics department was revitalized by the formation of an active theoretical physics group. The interaction between theoretical and experimental physicists has been quite beneficial. Proof of this is the painstaking work done on reactions (d^6, Li) with the synchrocyclotron.

In 1973 new physicists joined the group and a reactions program (alpha, xn) was begun using the synchrocyclotron. In addition to obtaining results of interest, this work helped to improve the work done in cooperation with foreign institutions.

In 1976, approval was obtained for the acquisition of a Tandem type accelerator for heavy ions. Preliminary discussions were held with the High Voltage Corporation and the NEC [National

Electrostatics Corporation] in the United States. In 1977, it was decided to purchase a Pelletron 20 UD accelerator from the NEC, and construction began on 1 December of that year. The time scheduled for construction was estimated at 32 months; shipping time at 3 months, and assembly and testing at 15 months. It is expected to be operational in 1982.

The research plans of the CNEA's physics department for the next few years will be closely linked with the purchase of this machine, which will require a significant effort, along with a revitalization of the group of scientists working in the field of nuclear physics. Not only will the physics department with its nuclear physics, solid state physics, and theoretical physics groups have to adjust their plans to the new accelerator, but also other departments such as reactors, radiobiology, and special projects may also become increasingly interested in the efficient use of this accelerator.

At the same time, they should also expand the group of scientists in the physics department in order to have the new accelerator used efficiently.

Over all these years, the work of the physics department has covered a great variety of areas, not only in its fundamental area of applied research, but also in the generally unpublicized fields of the generation of support infrastructure (micromechanics, electronics, computers, radiological safety, etc.), without which any achievements in nuclear physics would be impossible.

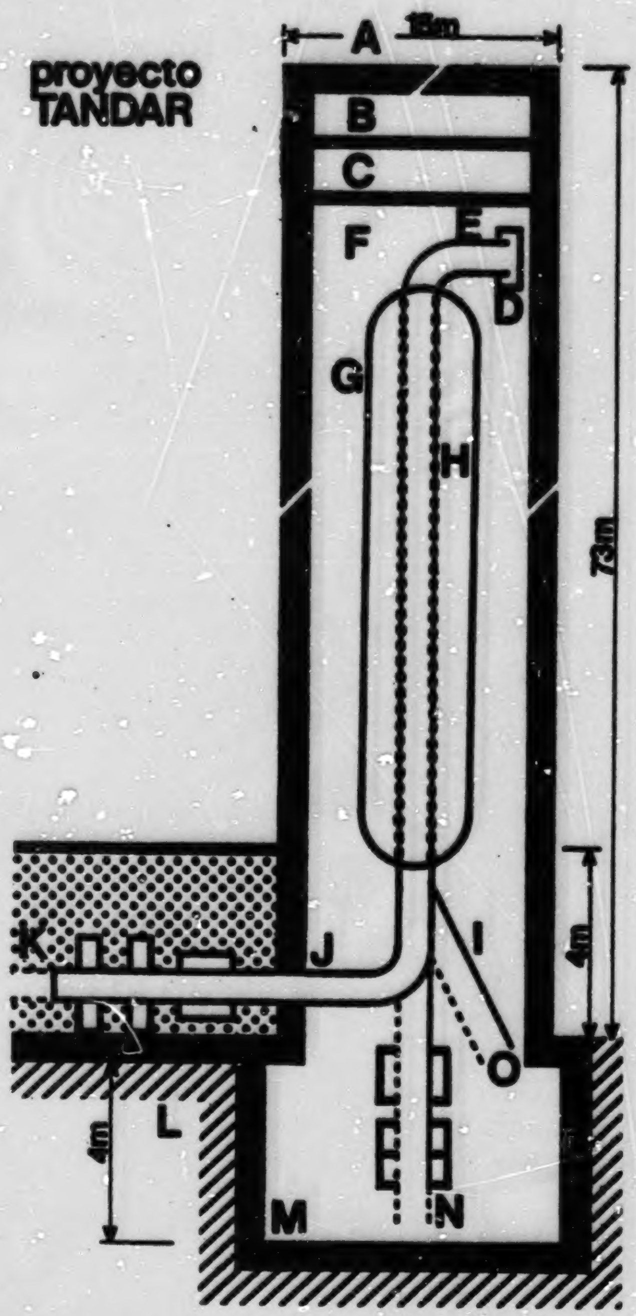
During the course of its short history, the physics department has worked on topics such as transfer reactions, gamma spectroscopy through reactions (alpha, xn) and similar reactions, line studies of fission fragments, magnetic moments of excited states, hyperfine reactions, nuclear structures, nuclear reactions, applied nuclear physics, studies of radioactive decay, vibrational spectroscopy, crystal structures and phase transformations, Mossbauer spectroscopy, theoretical solid state physics, theoretical and experimental studies of the use of solar and wind energy, applied electronics, computers, and the development of particle accelerators.

The New Accelerator

The new accelerator is scheduled for 20 MV; the acceleration system is of the Pelletron type; it has a number of well differentiated sections, and is designed to include the latest advances in particle accelerator technology.

Figure 1 below shows the operation of the accelerator in schematic form.

TANDAR project



Corte esquemático de la torre principal, y la columna del proyecto TANDAR.

Referencias:

A: Edificio dodecagonal de la torre.
B: Tanque.
C: Sala de Conferencias.
D: Fuente de iones.
E: Preacelerador.
F: Imán deflector.
G: Tanque de acero inoxidable.
H: Columna de aceleración de alta tensión.
I: Imán deflector.
J: Salida a 90°.
K: Una de las líneas experimentales a 90°.
L: Suelo.
M: Sala de experimentación en el subsuelo para haces moleculares.
N: Línea experimental directa.
O: Una de las líneas experimentales a 15°.

Key for Figure 1:

1. Schematic view of the main tower and column for the TANDAR project.
2. References
A. 12-sided tower building
B. tank
C. conference room
D. ion source
E. preaccelerator
F. deflector magnet
G. stainless steel tank
H. high voltage acceleration column
I. deflector magnet
J. 90° outlet
K. one of experimental lines at 90°
L. ground level
M. underground experimental room for molecular beams
N. direct experimental line
O. one of experimental lines at 15°

In the upper part of the tower is the ion source which provides the ions which are to be accelerated. At this level, there is a horizontal preacceleration phase which acts as the ion beam injector into the high voltage acceleration phase.

After being preaccelerated, the ion beam is curved to 90° by a deflector magnet so that the beam can be injected into the vertical high voltage phase. In this phase, the ions are accelerated toward the base of the tower, where they are again deflected by a deflector magnet to obtain a horizontal beam that will be directed toward the different experimentation lines. It is also possible to have direct beams and beams deflected 15° in relation to the vertical line.

If we analyze in greater detail the operation of the various phases, we can say that the injection system, which includes the ion source, consists of a low voltage column, an electrostatic injector with a magnetic deflector, and three modules of interchangeable ion sources, to provide the system with greater versatility.

The low voltage column of the injector is designed to withstand 300 KV of continuous negative voltage, and inside the column the ions are accelerated in a high vacuum. The beam thus generated and preaccelerated is then deflected to 90° by a dual focus magnet, which not only introduces the beam in the acceleration phase, but also removes any undesirable components from it.

At the same time, there is a pulse system that produces ion pulses of about a nanosecond after acceleration; this system is located at the low energy input of the machine. The system can be used for both light and heavy ions.

Next is the high voltage acceleration phase which provides a maximum acceleration voltage of 20 MV between the injection system and the mid-part of the acceleration column. This column is built in modules and is 34.84 meters long. Then, between the middle of the column and its lower end there is also 20 MV maximum voltage, so that with load exchangers applied to the middle of the column, there can be a net acceleration throughout the column of 40 MV.

As the beam moves within the column at a a pressure of about 10^{-9} Torr., the dimensions of the building containing it would have to be enormous to permit a good area insulation, in dealing with such high voltages. For this reason, the high voltage acceleration column is enclosed inside a stainless steel tank which, once the column is installed, will be filled with sulphur hexafluoride. Because of this product's excellent dielectric properties the size of the building containing the accelerator can then be considerably reduced.

For the high voltage terminal load, two independent groups are used with two Pelletron type chains that can transport a load of 400 microamps to the terminal.

Complementary Systems

The control system was designed by combining light loops with mechanical rods, and the digital control system includes transmissions by CAMAC modules using a PDP 11/23 computer.

To provide service access to the column, two mobile platforms are used; one of these is ring-shaped and surrounds the column, while the other moves inside the column.

When the ions reach the lower part of the column, they have already reached the maximum energy the accelerator permits, so they are then available as projectiles to interact with the targets provided in the different experimental research lines. Therefore, at the output of the high voltage column, there are various ways in which the beam can be oriented in order to guide it to the desired region.

One possibility is to use the beam without modifying its output direction, so an experimentation room has been provided directly under the column, below ground level.

The stainless steel tank, already installed. Surrounding the tank, construction is starting on a cement tower. In the foreground can be seen, already built, the cement foundations for the spherical tanks that will contain the sulphur hexafluoride.

Another possibility is to deflect the beam to 90° again in order to place it once again in a horizontal plane. This is done by another deflector magnet mounted on a rotating base so that the beam can be supplied to one of 30 output windows that cover approximately 270° of the plane in which the deflector moves.

To supply the sulphur hexafluoride which will provide the insulation for the column, some special facilities have been planned. The insulation material will be stored in a gaseous state, unlike other plants of this size, which use liquid storage. A study done by the CNEA shows that both systems are equivalent in price when operating costs beyond a period of 10 years are taken into consideration. In these conditions, the gas storage system is simpler, more versatile, and more reliable. The system was designed and built with local technology. The storage is done in two spherical tanks 10 meters in diameter which are located outside the building, and which have a volume of 520 m^3. The insulating gas is supplied from these tanks to the column through special equipment, which includes pumping devices, noise abatement systems, and purification circuits.

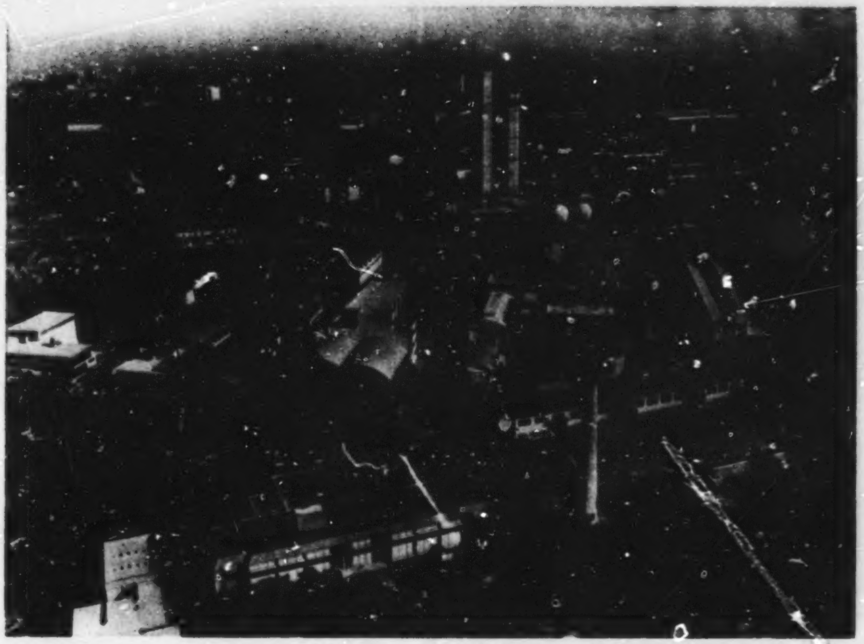
The gas recirculation and purification system was contracted directly from the NEC. It has two turbocompressors which produce a continuous flow of gas to an aluminum absorption base. These turbocompressors act as dehydrators to remove any impurities that may be present in the gas, and before reinjection, the gas is cooled in a heat exchanger. Finally, the gas is filtered before being introduced in the tank. The system is designed with two dehydrators, so that when one is in operation the other can be reactivated by a 400°C hot air current.

Building Distribution

Logically, the main building is the tower structure that houses the tank containing the accelerator. This building has a 12-sided shape, a diameter of 15 meters, and a height of 73 meters. The design provides the stability needed for acceleration during periods of strong winds and intense solar radiation. It is also designed with an adequate concrete thickness to serve as protection against radiation when the accelerator accelerates protons and deuterons at maximum energy. This tower houses not only the accelerator itself, but also the ion source, the injector, and the 90° magnetic analyzer.

There will be a conference room in the upper part of the structure. Access to different levels of the tower will be provided by two elevators. One is a freight elevator, and the other, more rapid, is for passengers.

Great care has been taken in designing the experimental areas in order to provide great versatility for the experimental lines. Not only have they considered the size, shape, number of rooms and access points, but they have also tried to have the greatest amount of space possible available in the vicinity of the base of the accelerator for different project lines, combining this with ease of access to the controls, data handling, and service areas. The experimental rooms occupy approximately 270° of the sector. There are two multipurpose shielded rooms which can be outfitted with cranes. Two access doors with removable concrete blocs connect these areas directly to an outside route, and supply the space needed to bring in any possible heavy equipment that may be desired. There is a heavily protected area for high radiation experiments. This area was planned to accommodate part of the electromagnetic isotope separator.



The Constituyentes Atomic Center at the intersection of General Paz and Constituyentes avenues. Immediately behind this center, now under construction is the tower which will house the accelerator. The spherical tanks, in front of and to the right of the tower, are the storage tanks for the sulphur hexafluoride.

Also planned are two unprotected work areas. In the future these areas may be shielded and equipped for project work.

Directly below the 90° magnetic analyzer is an experimentation room designed for molecular beam studies using the 15° outlet.

The control room and data collection room are located on the lower level and have direct access to the experimentation rooms.

The gas handling facility is on two levels, so that the pumps can be located as close as possible to the tanks. For this reason the area has to be acoustically insulated from the rest of the work areas.

On the upper floors are located all the accelerator support laboratories, such as the electronics laboratory, the ion source development lab, the target preparation lab, densors, and safety services.

In addition to the main building, where the accelerator and the complementary areas listed above are housed, the first phase of the TANDAR project also includes construction of workshops, its own power generation system, and storage facilities. Furthermore, the offices and laboratories of the scientists in the physics and radiobiology departments will be located in a three-story building with an approximate floor space of 700 m^2, so these departments are to be transferred to this site from their present location in the CNEA's main headquarters.

Consideration is also being given to a later transfer to this site, to facilities whose construction is not included in this first phase, of the entire research division and the solar energy, reactor chemistry, and planning groups. The area initially planned for this second phase is about 5,000 m^2.

Later Phases

Because of its versatility, the Tandem 20 MV accelerator can be used for a wide range of research activities. Some of the programs to be begun are described below.

Although the machine can handle about 30 different research lines, initially it will operate with only six. These lines will be equipped with everything needed to handle the beams and complementary equipment, depending on the requirements of each research project.

There are plans to begin four experimental research lines in nuclear physics: a number of multipurpose correlation tables for gamma spectroscopy from nuclear reactions; an electromagnetic isotope separation line; a multipurpose dispersion chamber for light and semiheavy ions; and a dispersion chamber for heavy ions.

Of these four lines, the first two are already in operation at the CNEA and will be transferred to the site of the new accelerator.

There is a plan to install a magnetic spectrometer, and its purchase has already been decided.

A VAX 11/780 computer with a 2.5-megabit membry has already been delivered by the Digital Corporation, and work on the software for this system has begun.

Other project lines are now in the planning stage. These are in the fields of nuclear physics, atomic physics, solid state physics, and radiobiology. Applied research may be done in fields such as metallurgy, dosimetry, and radiological protection.

When the physics department has the new accelerator, it will be able to handle problems such as elastic and highly inelastic dispersion, particle transfer, fusion, fission, measurement of "flight times," gamma spectroscopy after nuclear reactions, electromagnetic isotope separation, radiation-induced damages, nuclear structures, nuclear reactions, and applied nuclear physics.

When the TANDAR project is completed, it will be the greatest project of its kind in Latin America, and one of the main such projects in the world. This will enable the CNEA's physics department to become a strong research center, capable of working with other prestigious institutions, both in Argentina and abroad. It will also be an attractive research facility for training scientists, primarily for the Latin American nations.

Based on the schedules, we can estimate that the accelerator will be operating by the end of 1982, so we could expect the research program to begin sometime in 1983.

Training Specialists

Along with the design and construction of the accelerator, a program is also being conducted to train human resources, both for the short term and the long term. The plan calls for bringing new people into research projects and providing advanced training for personnel already in the field.

The initial program began in early 1977 with the hiring of eight scientists. In early 1978, six more scientists were added, and in following years there were plans to increase staff levels, based on the needs of the physics department. Now the scientists working in this training program are in postgraduate programs and are working on research projects, preferably of an experimental nature, in research centers in different parts of the world (Munich, Oxford, Rehovot, Stony Brook, Berkeley, Oak Ridge, Seattle, Copenhagen, Heidelberg, and the CNEA).

At the same time, some scientists from the department are at the NEC laboratories in the United States, working on the construction of the accelerator.

Working sessions are being held--the Nuclear Physics Workshop program--which include 2 weeks of conferences and discussions on issues related to the TANDAR project; international experts in the field are taking part in this program. To date, four such meetings have been held, the first two in 1978 and 1979 at the Balseiro Institute of the Bariloche Atomic Center, and the last two in 1980 and 1981, in the city of Buenos Aires. These meetings are partly intended to state in a more precise and detailed way the problems to be faced in the research to be done with the new accelerator.

Placement of the lid on the stainless steel tank. The high voltage acceleration column will be located inside this tank.

When the TANDAR project and the research lines are actually in full operation, the various departments that will use this accelerator may be able to make new and valuable contributions to the world's scientific knowledge. Considering the background of its short history and the professional seriousness of the work done at the CNEA, we are sure that this promising future will soon become a reality.

7679
CSO: 5100/2009

REAGAN STATEMENT ON NUCLEAR POLICY CRITICIZED

PY252225 Rio de Janeiro LATIN AMERICAN DAILY POST in English 23 Oct 81 p 4

[Text] One of the most enjoyable characteristics of the present American chief executive is his informal, charming manner, always leaving his guest-hosts-interrogators feeling perfectly at ease. This is an excellent trait in a politician and one that has served Mr Reagan well. Unfortunately, we have been seeing rather too often the extension of this manner into situations and discussions where it is out of place.

The latest incident involves a casual, ill-conceived Reagan remark on nuclear policy that has caused dismay from Washington to Bonn. It is hard to believe, given the growing peace movement in Europe, that Mr Reagan could have been so naive as to suggest, as he did to several newspaper editors last week, that it is possible to wage a limited nuclear war on European territory. It is completely irrelevant to claim, as the State Department did after the event, that the concept of flexible response has for years formed part of NATO battlefield strategy. The problem at present lies in the minds of Europeans who are engaged in a collective mental recall of the results of two world wars fought in Europe, a recall that is being profitably assisted by Soviet propaganda. Within this context, Reagan's statements were rather like shouting, "fire," in a crowded theater and produced the predictable results. Editorial writers on both sides of the channel had a field day conjuring up the image of armed-to-the-teeth America being stampeded towards Armageddon by a smiling, inept old man.

The trouble here is that if Reagan or Weinberger or any of the administration hawks are to speak about arms they must realize there are two audiences. To date the Reagan people have delighted in talking tough and tossing their shoulders back in a swaggering gait; apparently hoping to convince the Russians a Reagan is not a Carter. At the same time though they must convince the Europeans there is necessity for the type of re-arming Reagan is proposing. Many of these new weapons are to be placed on European soil. These countries are democracies and their people must believe in the urgency of meeting the Soviet arms build-up on the past decade. If they do not, then the United States may find its allies pulling out from the current missile deployment agreement. Such a result would be disastrous for the free world. To prevent this, Reagan, the great communicator, must learn to measure his words more carefully when the discussion enters the realm of nuclear warfare. No nation in the world will remain allies for long with someone who admits he may be willing to sacrifice them in a limited war.

CSO: 5100/2026

NUCLEAR CHIEF DENIES COST OVERRUNS IN NUCLEAR PROGRAM

Rio de Janeiro O GLOBO in Portuguese 11 Oct 81 p 34

[Interview with Brazilian Nuclear Corporations [NUCLEBRAS] Chief Paulo Nogueira Baptista by Walter Diogo of O GLOBO; time and place not indicated]

[Text] The Brazilian Nuclear Program continues to be a priority, so much so that investments of $14 billion are scheduled for the nuclear sector in the next 15 years. Almost $1 billion in equipment will be ordered annually from national industry.

In an exclusive interview with O GLOBO, NUCLEBRAS President Paulo Nogueira Baptista reiterated that the cost of the program is still $24.8 billion: $14 billion will be spent in the construction of nuclear powerplants; $4 billion will be spent for fuel production and reprocessing plants and $6.8 billion are for financing expenses for the loans which finance the program.

Paulo Nogueira Baptista ssserts that the estimates revealed recently, which attribute new prices to the nuclear program, have no basis whatsoever. He reports that the uranium production unit in Pocos de Caldas, Minas Gerais, will still be inaugurated this year. The first part of the nuclear fuel plant in Resende, state of Rio, will be ready in February 1982.

O GLOBO: There is talk of new costs of the nuclear program. A document published days back says that the cost will be $36 billion. NUCLEBRAS is talking about $24 billion. What is the real cost of the program today? To what can those different versions be attributed?

Nogueira Baptista: The question of price is very complex. One of the difficulties in determining the cost, besides the special situation of the nuclear industry, is the fact that today we are working with money which does not have a constant value. This is not only so with respect to Brazilian money but others as well. That is why it is difficult to speak in the same figures always.

We have been careful to state a reference year with respect to the money about which we are speaking. For example, when we speak of the cost of Angra II and Angra III, we say that the cost is calculated on the basis of the value of July 1981. And we state that value in dollars, not because that expenditure is going to be made in dollars, because only part of it will be, but so that we can have a stable reference point to provide the people who pay for the execution of that program. The devaluation of the cruzeiro is continuing at such a rapid pace due to inflation that the mention of the cost in cruzeiros makes it difficult to understand the size of the amount.

O GLOBO: But what is the real cost foreseen today?

Nogueira Baptista: The cost of the eight nuclear powerplants contained in the Brazil-Germany Accord, plus the installations of the nuclear fuel cycle, was calculated by us at $18 billion in 1980 money. That is an estimate of the direct cost. It does not include financing costs. That is another problem. That indirect cost has been used against us as if that did not also happen in other long-range projects. Financing costs vary a greal deal.

Generally, when a project is initiated, what is done is the calculation of the indirect costs in terms of the return an investor would derive from investing his money in an alternate investment.

The Brazilian electric sector estimates at this time that the rate to be estimated for an alternate investment should be 10 percent. Actually, the final cost of any project is going to depend on the rates of interest actually paid. However, this is only learned after the project is completed. That depends on the financing obtained, the period of repayment and the rates at the time. Each financing has a different financing period. Therefore, the most that is done is to calculate, making an estimate of the profit if that money were invested elsewhere.

O GLOBO: But can a variation in the direct cost also be expected?

Nogueira Baptista: So that you may have an idea, it is enough to recall that the Itaipu powerplant had an estimated cost of $3 billion when its construction began. Today its cost is estimated at $12 billion. Now just imagine a program of more than 20 years.

The cost we consider as basic is the direct cost. The eight powerplants will cost $14 billion. The fuel cycle plants will cost $4 billion.

O GLOBO: Are the estimates published by the press real? How did those estimates come about?

Nogueira Baptista: We do not know who invented them. Actually they used a document which is a simple form used by the company in 1978 to make estimates of the cost of atomic powerplants. They used a form distributed in one of our seminars. The cost of powerplants was estimated in marks in that seminar and the figure used in the document distributed to the press talks about $36 billion. There is not the slightest relationship between one thing and the other.

O GLOBO: One of the criticisms frequently made of the Nuclear Program is the timing of investing $24.8 billion in the Center-South region for generating power in the most developed area. Would it be more advantageous for the country to use that amount of money in the production of hydroelectric power? It is a productive discussion...

Nogueira Baptista: It is not an investment of $25 billion. We must speak of the direct investment, which is $14 billion for the powerplants and $4 billion for producing fuel.

Brazil is going to spend that $14 billion in 15 years. In that same period Brazil is going to spend $4 billion per year in the production of hydroelectric power, which means $60 billion all together. Brazil is not throwing money away. It is making an investment in energy. That has one result: jobs and orders.

O GLOBO: Now, as to the problem of the timing of that investment?

Nogueira Baptista: The program is timely for several reasons. The present cost of a kilowatt produced by nuclear powerplants is higher than that of hydroelectric plants under construction. But it will not be higher than that of the new hydroelectric powerplants. The hydroelectric plants which will be built at the end of this decade will no longer be competitive with nuclear energy.

I believe that in 1990 nuclear energy will cost the same as hydroelectric energy. After 1990 the trend will tend to be reversed. Hydroelectric powerplants which produce energy at a low cost will cease to exist. However, nuclear energy will begin to decline in price.

There is another argument: Brazil has large uranium reserves. The Pocos de Caldas reserve is the one with the worst quality we have. Tataia is much better and much more promising. We can be great producers and exporters of uranium, a very valuable mineral in the world of today.

Let us discuss timeliness. Let us accept that Brazil would decide to exploit the 213,000 megawatts indicated in the surveys of usable water falls for the generation of electric power. Let us accept that Brazil would invest only in hydroelectric power and that the potential of 213,000 megawatts would be completely used, something which is not true. Actually the production obtained would be less. What would happen? In the year 2003 that potential would be almost totally in use and the country would need nuclear power in order to continue supplying the people. Obviously for Brazil to be able to build nuclear powerplants in the year 2000 it would have to begin its program in 1990. Therefore we would be a little bit ahead of schedule.

Now let us look at reality. What is going to be produced in hydroelectric power is quite a bit less than the 213,000 megawatts indicated in the inventory of usable rivers.

O GLOBO: Why is it quite a bit less?

Nogueira Baptista: Some of the usable falls could generate power at a cost estimated today at $3,000, $4,000, $5,000 and even $10,000. Today the kilowatt produced by a nuclear powerplant costs $2,600. But it tends to decline. However, as I already said, cheap hydroelectric power will disappear in 1990. Obviously, many of the plants which produce at a very high price will not be used.

The government could opt for a postponement of the nuclear program until the decade of the 90's but it would have to simultaneously initiate the construction of eight powerplants in order to provide for the power needs of the country. Moreover, it would have to build those eight powerplants at an accelerated pace, develop the technology and make industry capable of producing equipment.

Now, what option was selected? It was decided to initiate the program of construction of the eight powerplants at a deliberate pace. We are going to arrive at the decade of the 90's with the majority of them operating to complement the supply of energy provided by the hydroelectric plants, but we shall have installed an industrial capability able to manufacture the plants and we shall have assimilated a technology which will be decisive for the country in the year 2,000 when we shall only be able to count on that type of energy for certain.

O GLOBO: Another criticism usually made of the Nuclear Program is with respect to the number of powerplants acquired. Several scientists say that Brazil could assimilate the technology by buying only four powerplants from Germany. Do you agree with the purchase of eight of them is excessive?

Nogueira Baptista: That is where the deceit lies. That is a lie which has been repeated in a very malicious way. What Brazil is buying is the technology for building the powerplants in Brazil.

At first we are going to use a certain amount of imported equipment which could even by very considerable.

O GLOBO: What is the degree of national manufacture of that equipment?

Nogueira Baptista: The foreign share will be 30 percent in the first powerplant. In the last one it will be 10 percent. Therefore, it is a lie to say that we are going to buy eight powerplants. Even the reactor itself will be built here in Brazil. The Sao Paulo powerplants will have reactors built in Brazil. What we are buying is the technology.

They also accuse us of buying junk. They say that our technology is obsolete. The truth is that German technology is one of the most advanced in the world. That is not said by the Germans but by the Japanese, French and others.

O GLOBO: Now, how are we supposed to understand the fact that the Germans bought only one atomic powerplant from the United States in 1950 and developed their technology, while Brazil has to build eight of them?

Nogueira Baptista: Well, the Germans took more than 20 years to develop that technology and to arrive where they are today. If we were to try to invent the reactor now, we would perhaps only arrive where they are now in 20 or 30 years.

O GLOBO: Another question being discussed frequently within the Nuclear Program is about the participation of the Brazilian scientific community. Many technicians continue saying that the program excluded Brazilian scientists. Do you believe that NUCLEBRAS should invest in research to develop that technology which is being assimilated? Do you believe that Brazilian technicians could develop that technology, that we are going to import, here in Brazil?

Nogueira Baptista: Nuclear energy is a relatively new activity which emerged with a clearly scientific base. A large part of the industrial development in the world did not have that same scientific base. The other technologies emerged with a certain independence with respect to science. In the nuclear area science came before the industrial phase. However, today the industrial phase has assumed the leadership in that activity. The scientists have become somewhat nostalgic.

O GLOBO: We are now seeing Brazil negotiating for the importing of fast breeder reactors from Italy. Could Brazil not invest in research and advance in that technology of the future?

Nogueira Baptista: We are investing a great deal in the training of personnel and in research. It is obvious that we are going to assimilate German technology and we are going to develop it. However, it is not a function of NUCLEBRAS to develop a new type of reactor. I have doubts that it is a priority for Brazil and that Brazil should invest heavily to reinvent things that have already been created abroad.

I believe that Brazil should follow closely, and with great moderation and objectivity, the research being done on fast breeder reactors. We do not have the scientific and technological base in Brazil for performing that type of research. We cannot presume in Brazil, a country which does not yet know elementary phases of the technological process, to invent more advanced reactors.

We need well-trained personnel here to follow developments abroad. Brazil does not have enough resources for investing in a research program.

O GLOBO: But does Brazil not run the risk of always having to buy technology?

Nogueira Baptista: We can only resolve that problem in the long term. We cannot invert the problems. To think that Brazil can avoid importing technology is not a practical reasoning. To think that Brazil can become independent in advanced areas is to think in an unrealistic manner.

Brazil does not have a space program. How could it be otherwise? To think of having the leadership in that type of technology is a vain pretension.

O GLOBO: Do you believe that the technology that Brazil is importing today from Germany could be produced in Brazil if the National Nuclear Energy Commission [CNEN] would give priority to its development by Brazilian scientists?

Nogueira Baptista: In no way. We do not have the human or financial resources nor the industrial infrastructure. We can do what Germany did throughout years, improve on foreign experience. However, it is impossible to develop a reactor of our own beginning from zero.

Even if we had an Einstein, he would not be able to do in Brazil what he did in the United States where there is a research structure in the universities, government laboratories and in industry. A structure where the scientist can talk with industry with no difficulty and acts jointly with it can quickly produce the equipment.

O GLOBO: The Nuclear Program is being implanted in the midst of a difficult phase in the Brazilian economy and requires many resources. Will it continue to be a priority area for investments next year?

Nogueira Baptista: Yes, it will continue to be. Energy is generally a priority item. There are momentary difficulties but they will be overcome. Brazil cannot cease to make investments in energy. The only way to overcome the difficulties in the balance of payments today is to resolve the problem of the structural vulnerability we have today from the energy point of view.

The Nuclear Program will continue normally next year. We expect to invest nearly $14 billion in the next 15 years, which means almost $1 billion per year in orders for equipment and services from national industry.

Construction of the Angra III powerplant should begin in the second half of next year. We expect to have the construction company in the project site by that time.

Nine large civil construction companies have already presented bids for construction. By May we shall have decided on a bid.

The competition for the selection of the company which will build Angra II will be judged in July 1982.

Moreover, by the end of the year we are going to inaugurate the Pocos de Caldas natural uranium production unit, and the fuel element plant of Resende in the state of Rio, in February 1982. The Nuclear Program continues to be a priority.

O GLOBO: Another question is the location of the powerplants. Many technicians advocate the theory that the population should be asked whether they want the powerplants. They advocate the holding of a plebescite as they did in Germany.

Nogueira Baptista: That is not correct. There was no plebescite in Germany, since it is even forbidden by the German Constitution, which is also one of the most democratic in the world. The plebescite, contrary to what some environmentalists argue today, is an institutional mechanism of consultation which is not very democratic. The plebescite was always used by the great dictators: It was used by Hitler in a very simplistic way, by Stalin and by Mussolini. It is forbidden in the German Constitution precisely because of the fear of the Nazi past. And now it is argued in Brazil that the plebescite is a democratic solution...

O GLOBO: Sweden held one, did it not?

Nogueira Baptista: Sweden held a plebescite after it already had a very large nuclear-electric program, among the largest in the world, which provides 25 percent of the energy needs of the country, because of a question of contingency, because there was that antinuclear wave in the world. Because of a certain political contingency the government had to make that type of consultation and the response was positive. And the government continues with the program. The result of the plebescite was in favor, not against.

There was a localized plebescite in Sweden, which was favorable; in Austria there was a localized plebescite (it was not of a national scope) and it was against.

O GLOBO: But you note that they are democratic experiences...

Nogueira Baptista: I do not know whether that is the best solution for a consultation, nor do I know that it is valid. It always happens under certain conditions. If the government had to submit all its decisions...

O GLOBO: There was a case in Germany where a powerplant was embargoed for years.

Nogueira Baptista: But that was not a plebescite. It was a judicial decision. A popular action. It was halted for some 3 years...

It remained idle for a long time. It caused great harm to the country. It was caused by minorities who are blocking the democratic process. What happens in Germany is a typical case of a minority, which because of the relative instability of the government coalitition, manages to block government actions.

O GLOBO: Would you accept participation in a political decision in the nuclear area?

Nogueira Baptista: I would not fear it at all. I believe there is no program which has been discussed more in Brazil than the nuclear program; more than the PROALCOOL [National Alcohol Program], coal or any other. It is not true that it is not discussed, it is the most discussed. The problem is that such a type of consultation would not be democratic. Democracy to us is representative; it is the representatives of the people who have to be responsible, assume the responsibility and not return that mandate to the people through a plebescite. Whoever resorts to that type of procedure is generally of a dictatorial tendency, someone who poses questions on the basis of "yes" and "no" answers. Questions of that complexity cannot be answered in a simplistic manner.

Democracy is an objective and a means. Democratic objectives must be reached by democratic means. Democracy cannot be thought of as only a means for accomplishing authoritarian, dictatorial objectives. Democracy is something more complex than that. I believe that the adoption of processes, which are not very democratic, such as the plebescite, for the solution of clearly technical problems does not serve the consolidation of democracy in Brazil.

8908
CSO: 5100/2016

BRIEFS

NUCLEAR FUEL EQUIPMENT--Israel is denying the assertion made in a new book, just published in New York, according to which Israel has equipment for the manufacture of nuclear fuel which has for many years enabled it to develop nuclear arms. According to the book, The Nuclear Barons, the equipment was purchased in France at the end of the fifties, when Israel received a French nuclear reactor. According to the book no publicity was given to the supply of the equipment for the production of nuclear fuel, which enables Israel to manufacture atomic bombs. A spokesman of the Israeli Nuclear Energy Commission told our correspondent Gadi Sukenik that the Israeli reactor is a research one with a 24-megawatt capacity, and Israel does not engage in the separation of nuclear fuel, nor does it use the reactor for military purposes. The spokesman recalled that similar denials have already been issued more than once by government officials in the wake of various reports in the foreign press. [Text] [TA251122 Jerusalem Domestic Service in Hebrew 1100 GMT 25 Oct 81]

CSO: 5100/4704

KOEBERG NUCLEAR REACTOR CONSTRUCTION VIEWED ON SCHEDULE

Paris AFRICA AFP in English 6 Oct 81 p 27

[Text] Cape Town, October 3--The first reactor of South Africa's nuclear power station at Koeberg, 30 kms (20 miles) from here, will be ready to go on line in mid-1982, but the authorities have still not solved the question of enriched uranium supplies.

Slightly more than five years after South Africa's Electricity Supply Commission (ESCOM) gave the contract to three French companies construction work is well on schedule.

Some 400 Frenchmen are among the 4,500-strong labour force working round the clock along the windy sand dunes to the north of Table Bay.

When it is operational the Koeberg station's two reactors will produce a total of 1,800 kilowatts--about 10 percent of national demand--and take South Africa into the exclusive club of countries with nuclear power stations on grid.

The Republic is well endowed with coal deposits, which fuel about 80 percent of national electricity supplies, and is being cautious about moving into the nuclear power age.

Future Uncertain

There has been no decision of whether other nuclear stations will be built.

Nor is there any indication that ESCOM will have solved the problem of uranium supplies before the Koeberg station's scheduled completion date.

The United States agreed in 1974 to enrich sufficient South African uranium for Koeberg, but now refuses to re-export it to France where it is transformed into combustible pellets. This is the result of a decision taken by Washington in 1978 not to export fissionable materials to countries which had not signed the Nuclear Non-Proliferation Treaty.

South Africa has declined to sign the treaty because this would open the way to international checks on all its nuclear installations, and the Pretoria Government wants to keep some of these under wraps, particularly the ultra-secret Valindaba centre near the capital.

Specialists here say that the South Africans, who claimed to have invented a new enriching process, will not be in a position to enrich uranium themselves before 1985, three years after Koeberg is ready.

It remains to be seen what will become of the 2,300 million rand (2,500 million dollar) project if South Africa is unable to find about 75 tons of enriched uranium before the end of next year. (A.F.P.)

CSO: 5100/5603

STATE RESEARCH FACILITY MODERNIZING ITS TEST NUCLEAR REACTOR

Helsinki HELSINGIN SANOMAT in Finnish 10 Oct 81 p 10

[Article: "New Control- and Adjustment System for Test Reactor"]

[Text] The State Technical Research Center is modernizing its test nuclear reactor. The reactor has been in operation in Otaniemi since 1961. It will now be equipped with a control- and adjustment system built on the basis of Finnish-Hungarian cooperation.

Also the operational safety of the reactor will be increased by moving the monitoring unit from next to the reactor vessel to a separate monitor building.

The previous significant modernization of Finland's only test reactor was accomplished in 1971. At that time its capacity was increased from a modest 100 kilowatts to a still relatively modest 250 kilowatts.

Finland's test reactor is the smallest in the world. Generally the test reactors in operation have a capacity 200 times that of Finland's reactor. However, the Otaniemi test reactor has properties which make up for its small capacity. Rather large amounts of radiation can be produced with this reactor in a short period of time.

The Otaniemi reactor will be especially suitable for training purposes after its modernization. With the help of the nuclear power plants it can be used in medical research and in environmental protection engineering as well as in geology, the processing industry, and scientific research on materials, states sources from the VTT [State Technical Research Center]. According to Professor Juhani Kuusi, director of the Reactor Laboratory, the Otaniemi reactor can be used until the year 2000.

Modernization Will Cost 2 Million

The control- and adjustment system should be completed by the middle of November. According to Doctor of Engineering Bruno Barsi, project director, it is the result of a study begun in 1977. The modernization of the equipment will cost approximately 2 million markkas.

The basis for this modernization has been that the mechanical portions of the reactor are in good condition, but its instruments have become obsolete.

The old system was difficult to maintain and partially modernize. On the other hand, the new equipment is designed so that it can be expanded according to the development of technology.

The modernization of the American-built test reactor at Otaniemi will make it even more international. The Physics Research Institute of the Hungarian Academy of Sciences will produce approximately 20 percent of the new instrumentation. The modernization of the test reactor is also a monopoly area for Valmet, which will produce 80 percent of the equipment.

Originally the test reactor was primarily used for training purposes. In recent years it has had increasing significance in practical tasks, states sources from the VTT.

Advantage Based on Neutrons

The advantage of the test reactor is based on the neutrons thrown off from its uranium fuel. The neutrons make elements radioactive in a different manner and on the basis of the differences very small substances can be studied.

Borrowing an example from geological research it is pointed out that it is possible to analyze the gold content of a rock sample, which in relative linear units is approximately one-half millimeter of 100 kilometers.

Radioisotopes used in medicine can also be produced by these neutrons. With them it is possible to study, among other things, the condition of kidneys and disturbances of cerebral blood circulation, which are otherwise difficult to examine.

The VTT Reactor Laboratory also conducted material studies by which it has been possible to observe the degree of brittleness in the pressure vessels of the nuclear plants. The results of research have concluded that the fuel in Loviisa 1 has already been reduced by approximately 10 percent and the fuel in Loviisa 2 will be reduced in connection with the next annual maintenance check.

The Reactor Is Safe

Not as much attention was given to the safety of the Otaniemi reactor when it was built as is now being given to the safety of the nuclear reactors. The Otaniemi test reactor does not, for example, have an airtight protective shelter.

Experts still consider it to be exceptionally safe. This safety factor is a result of the reactor's fuel, which extinguishes itself. In practice this means that even though the nuclear reactor is not stopped, the reaction will not continue, but will burn down to its original point.

10576
CSO: 5100/2011

AEC HEAD CITES NEUTRON BOMB MASTERY, BUDGET NEEDS

Paris LE MONDE in French 6 Oct 81 p 48

[Text] The AEC [Atomic Energy Commission] is well on the way to achieving mastery of the enhanced radiation weapon, otherwise known as the neutrom bomb. This was reported to the deputies by Michel Pecqueur, the AEC's general administrator.

Mr Pecqueur spoke to the members of the defense commission of the national assembly on Wednesday, 30 September, at the Palais-Bourbon. He was accompanied by Jacques Chevallier, director of military applications at the AEC: Mr Chevallier is in charge of studies, research, testing, and fabrication of nuclear warheads and of naval nuclear propulsion systems.

The AEC's general administrator told the deputies that the neutron bomb, because of its lower collateral damages, could be fired closer to friendly troops and over a larger proportion of the territory without threatening urban areas. This factor makes it, he commented, a good defense weapon. Mr Pecqueur stressed the fact that if increasing the effectiveness of weapons tends to increase their credibility, then the result is that the more credible a weapon is, the less chance there will be of actually using it, for it will have a greater deterrent power.

Indicating that the AEC, after making great advances in the area of studies, is well on the way to achieving mastery of the neutron bomb, Mr Pecqueur added that the decision about whether or not to manufacture it is a political matter.

The AEC's general administrator then pointed out the need to use full-scale nuclear testing. Since 1975, France has conducted underground testing in Polynesia.

Mr Pecqueur stressed the fact that the physical phenomena which are produced in a nuclear explosion take place under pressure and temperature conditions similar to those prevailing in the sun, and thus these conditions can not be reproduced in a laboratory setting. He explained that this is one of the reasons justifying full-scale testing. Another reason is the need to really try out these weapons, for phenomena could occur which might not be detected in calculations and simulations.

Then the AEC's general administrator gave the reasons why he feels the budget of the military applications division should cease to decline in relative terms.

In general, he said, after the government funding of equipment during 1965, 1966, and 1967, required by the construction of the Pierrelatte plant, the portion of the gross domestic product allocated to the AEC for military purposes declined from 0.27 percent in 1968 to 0.11 percent in 1978. This proportion has since tended to rise, because of the need to maintain new weapon systems and to prepare for the future. Furthermore, we must replace test equipment designed between 1968 and 1978, which has aged and needs to be replaced.

7679
CSO: 5100/2013

VIOLENT ANTI-NUCLEAR DEMONSTRATIONS PRECEDE DEBATE

Golfech Site Penetrated: Arson

Paris LE MONDE in French 6 Oct 81 p 14

[Article by Catherine Laurens]

[Text] Toulouse. The anti-nuclear forces opposing the Golfech plant have taken action. On Sunday, 4 October, during one of the largest demonstrations ever held in the region, they clashed with security forces.

Toward 1400, from 5,000 to 6,000 persons, according to the anti-nuclear coordinating committees, or 1,000 persons, according to EDF [French Electric Company] sources, began to march from Valence-d'Agen to Golfech (Tarn et Garonne department). The march, which was to lead to a site close to the plant which belongs to the environmentalists, proceeded calmly until about 1600. Then, while they were near the site, some demonstrators began to break down the fence.

The demonstrators then penetrated the site, where they burned several cars and sheds.

Then a squadron of 85 mobile gendarmes, until then invisible, intervened to clear the site, using tear gas grenades. As they were moving back, the demonstrators set fire to some EDF offices and blocked highway 113 with a barricade of burning tires. The clash lasted until nearly 2000 hours.

Mr Jean-Pierre Sielberstein, EDF's construction supervisor at Golfech, estimated the damages at 15 million francs. "The big dredger was badly damaged," he said. "I don't understand why they took such a highly undemocratic action when the debate in the assembly is to take place this week. This demonstration is even more incomprehensible as work at the site has been frozen since 30 July of this year by order of the council of ministers."

The environmentalists, members of the PSU [Unified Socialist Party], Young Farmers, and people from the region joined together behind Mr Paul Lafon, the mayor (without a nuclear "label") and some members of the municipal council, to protest.

"So far, people have treated us southerners as fools," said Jacques Paltz, a member of the regional coordinating committee. "We have advocated nonviolence, but obviously this hasn't worked. At Plogoff people fought to get what they wanted. Today we acted like the people of Brittany. The movement was spontaneous. We are determined to go to the bitter end if the plant is built. They tricked us. We voted for the left against nuclear power. Now Mitterrand is playing Giscard-style politics. We now have only one hope left: Paul Quiles, the chairman of the energy commission."

Paris PSU, Communists, Others

Paris LE MONDE in French 6 Oct 81 p 14

[Text] A demonstration against the government's nuclear program was held on Saturday, 3 October, at approximately 1500 hours, at the Place de la Bastille in Paris. About 3,000 persons took part. The demonstration was organized jointly by the PSU, the National Anti-nuclear Coordinating Committee, the Political Ecology Movement, the Revolutionary Communist League, the Union of Libertarian Communist Workers, and the Communist Committees for Management by the Workers.

Behind a large banner saying "Stop the Nuclear Program! For a True Democratic Debate!" the demonstrators began to march at about 1530. Their route followed the Rue Saint-Antoine, the Place du Chatelet, the Quai de l'Horloge, the Rue des Saints-Peres, and the Boulevard Saint-Germain.

The march would have reached the national assembly without incident, where it would have disbanded, if from 200 to 300 outsiders had not joined in the demonstration. The first disputes occurred shortly after the start of the march, in front of the Palais de Justice, which was guarded by the polce. Shouting "Free our comrades!" and "Mitterrand is a fascist!" the demonstrators hurled a number of projectiles at the police, who responded by the use of tear gas grenades. A little later, the windows of a police vehicle were broken on the Boulevard Saint-Germain, while a motorcycle policeman was tossed off his motorcycle.

Because of these incidents, the organizers of the march decided to order it to break up at 1730, somewhat earlier than planned, at the intersection of the Boulevard Saint-Germain and the Rue du Bac. At that moment a small group of outsiders went to force open the doors of the ministry of transport, at 246 Boulevard Saint-Germain. In a few minutes a car parked in the courtyard was set on fire and its windows were broken.

It took nearly a quarter of an hour for two fire trucks and police forces to get there, even though they were all over the area at the time. The violent demonstrators in the meantime had plenty of time to disappear after posing for photographs.

Calm was restored shortly afterward, while police on motorcycles patrolled the entire area of the sixth and seven arrondissements, in order to prevent any possible new outbreaks.

(At the public security office--the prefecture of police of Paris--it was reported that this delay of about 15 minutes between the start of the fire in the automobile parked in the courtyard of the ministry and the arrival of the police and firemen at the scene occurred because the information about these incidents did not reach the operations command center until 12 minutes after the incidents happened).

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EDITORIAL ON SIGNIFICANCE OF ANTINUCLEAR POWER MOVEMENT

Amsterdam ELSEVIERS MAGAZINE in Dutch 26 Sep 81 p 59

/Text/ It would be a pity if the discussion about the "shut down Dodewaard" demonstration is bogged down in mutual recriminations of demonstration leaders and the authorities. For there is certainly something more involved than the question of how the demonstration "got out of hand" and whether the Mobile Unit did not hit too hard. If the discussion is limited to that, then a Dodewaard will soon appear somewhere else or under another slogan, with an escalation of its bloody scope.

It is obvious that all those thousands alarmed about the environment who dared again prematurely to express their conviction deserve respect. Their mass presence around the nuclear power plant shows how much the energy problem affects broad strata of our people. But what must the authorities do about such a demonstration in practice? May this influence important policy decisions and if so, to what extent? And may it be involved in determining the result of the broad social discussion which must be conducted about the energy problem? The cry "shut down Dodewaard" has the drawback that everyone may wonder whether it is an emotional expression of a large number of angry people rather than a conclusion based on rational ideas. Therefore the demonstration cannot be regarded as a meaningful contribution to the broad social discussion. At the most, it again emphasizes its importance.

Consequently, what has been the deeper social meaning of the drama which was enacted at Dodewaard. Whoever listens to the organizers comes to the conclusion that it ultimately involves something more than shutting down our two nuclear power plants; it involves the reorganization of our democracy. An important characteristic of the antinuclear power movement is its unverifiability. The antinuclear power movement is not registered anywhere. It consists of a series of anonymous "basic groups." There is perhaps a national consultative organization but the basic groups are "autonomous." This means that really no one is responsible for the words and deeds of the AKB /Antinuclear Power Movement/, nor can anyone say what is the social importance of this group. The AKB's assertion that it speaks in the name of the "rank and file" and "the majority of our people" is a flimsy claim.

The AKB often becomes involved in antidemocratic activities on the basis of this unsubstantial claim. Even before government and parliament had decided whether the two nuclear power plants would remain open or not, the AKB cries "shut down Dodewaard" and reinforces that cry with stubborn efforts for a blockade. Those efforts themselves are an act of violence, regardless of whether in so doing a stone or a Molotov cocktail more or less was thrown. For the elected parliamentary majority must yield to the unverifiable group which arbitrarily calls itself a majority. If the genuine, verifiable majority reacts to that with the aid of the Mobile Unit, that is called violence. For the unverifiable majority is sovereign and inviolable. That is the philosophy of many AKB spokesmen; a philosophy which opens the way for violent behavior against any other decision of government and parliament.

It is high time to recognize the threat involved in this philosophy. Perhaps it is encouraged by the introduction of the broad social discussion. There are two objections attached to this phenomenon, however well intentioned it may be. The first is that it really is superfluous, because a well functioning democracy, by its nature, should be a broad social discussion; the second objection is that explicitly setting up such a discussion, and that with the capital letters BMD /Broad Social Discussion/, expresses insecurity about the powers and capacities of our own elected parliament. But even that broad social discussion does not go far enough for the AKB spokesmen; they refuse to take part in it. For they have their own "democracy" which is neither visibly broad or visibly social.

The baffling thing about "Dodewaard" is not the effect of the philosophy of the hard core in the AKB, but the ease and the innocence with which responsible politicians support that philosophy. Some of them make the mistake of not drawing any clear distinction between a (nonviolent) demonstration and a (violent) blockade. It was besides understandable that the government allowed a meadow at Dodewaard to be "occupied" (which, according to law, is always an illegal act) and that the same government did nothing when the demonstration leaders set up a radio transmitter on the occupied land. But toleration went too far when on the occupied land, against all the rules of normal PTT /Postal and Telecommunications Service/ operation, a telephone installation was provided, with the help of which the blockade was organized. Finally the AKB demonstration was not ended by the ME /Mobile Unit/ but by the citizens. It was a sign on the wall.

Showing respect for a peaceful demonstration is commendable. But government assistance in committing violence is all too foolish. If there still must be a broad social discussion, then there is a subject which goes beyond the question whether nuclear power plants must remain open or must be shut down. The main question is then: how do we defend our democracy against those who are besieging it?

END

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 123

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23 November 1981

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 123

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BRIEFS

ROK IMPORTS NIGER URANIUM--The government will consider imports on Niger uranium after 1985 to meet its uranium requirements for the 1990's, Energy-Resources Minister Pak Pong-hwan said yesterday. Pak disclosed this possibility when he met with Daouda Diallo, minister of foreign affairs and cooperation of Niger, at his office yesterday. During the Pak-Diallo meeting, the visiting Niger minister requested Pak to help Korea import uranium, some 60 percent of Niger's total exports. The Niger leader also asked Pak to extend positive cooperation in exploring and developing uranium reserves in the African country, according to an announcement released by the Energy-Resources Ministry. In reply, Pak said the nation had already secured a long-term supply of uranium which would meet its needs in the early 1990's. However, the government will study a plan to get Niger uranium after 1985 in order to improve binational relations. The energy minister also expressed willingness to help the nation provide technology to Niger for uranium exploration. The announcement quoted Minister Pak as requesting Diallo to exercise his influence for Korea's participation in Niger's various projects involving agriculture and construction. [Text] [SK310236 Seoul THE KOREA TIMES in English 31 Oct 81 p 7]

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EEC WILL BECOME BIG MARKET FOR LOCAL URANIUM EXPORT

Canberra THE AUSTRALIAN in English 30 Sep 81 p 29

[Article by Nicholas Rothwell]

[Text]

AUSTRALIA's new partner in a uranium agreement, the European Economic Community, will suffer a serious shortage of nuclear fuel within 20 years, and will be forced to import uranium from overseas, a study released this week shows.

The study of world-wide uranium supply prospects, carried out for the EEC Commission by the Batelle Institute in Frankfurt, reports that a crisis in nuclear fuel supply is looming world-wide.

Its findings, combined with the latest Australian Atomic Energy Commission figures for the cost of local uranium, suggest huge expansion potential for Australia's uranium export market.

Australia made an agreement on nuclear fuel supplies with the European Atomic Energy Community earlier this month in Brussels, which will pave the way for sales of Australian uranium to member countries of Euratom.

All the EEC countries have now agreed that Australian uranium supplies will be used only under strict international safeguard agreements.

A spokesman for the Department of Trade and Resources said yesterday the contracts which have already been agreed between Energy Resources of Australia Ltd and West German buyers, are expected to be followed by others between Australian firms and Euratom countries.

NEEDS

The safeguards are designed to ensure all exports of Australian uranium under new contracts to all the members of the EEC are carried out on terms acceptable to the Australian Government.

The EEC's need for uranium fuel to supply its nuclear power program is expected to become acute within the next few years because of a delay in the development of fuel reprocessing plants in Europe and the United States.

This will produce a steep increase in demand for Australia's cheap uranium reserves, as trends suggest even the US will become a net importer of uranium before the turn of the century.

The Batelle report points out that even if fast-breeder reactors are introduced before the year 2000 there will only be enough fuel on the world market to cover half the needs of the EEC, Japan and the US.

The uranium mining capacity of the West today stands at 45,000 tonnes a year and is expected to rise to a maximum of 120,000 tonnes a year by the end of the century.

But the Batelle report predicts shortages, not because uranium will run out, but because of limitations to mining technologies.

It says the industry's output will fall and costs of nuclear fuel will rise as the uranium content of ores still available will be low.

It pinpoints 1995 as the crucial year for the EEC.

CSO: 5100/7505

EDITORIAL CALLS FOR WESTERN VIGILENCE, DISARMAMENT PACT

Canberra THE AUSTRALIAN in English 2 Oct 81 p 8

[Editorial: "Why the West Must Not Throw in the Towel"]

[Text]

THIS week's report by the Pentagon claiming a dramatic growth in Soviet military power must frighten all of us. It is not news that the Warsaw Pact is stonger in conventional weapons than NATO's European armies. What is news is the Pentagon's assessment that qualitatively the East Bloc forces are gaining on those of the West. Previously the Atlantic powers could console themselves that their numerical inferiority was redressed by the superior sophistication of their equipment. Apparently this is ceasing to be the case, as is shown by the estimate that within seven years the US will have lost its lead in micro-electronics, computers and jet engines.

According to the US Defence Secretary, Soviet nuclear planning is directed towards "seizing the initiative through pre-emptive attack". Apart from the burgeoning Soviet nuclear arsenal, Mr Weinberger claims that the Russians and their Warsaw Pact allies now have the advantage in conventional forces and that "modern tanks, armored fighting vehicles, artillery rocket launchers, anti-aircraft artillery, missiles and other weapons now being fielded in large quantities are the result of an intensive multi-year investment program."

It is not necessary to be clairvoyant to predict that Mr Weinberger's warning will be explained by his critics as the result of his right-wing Cold War mentality or the hyperbole of a cabinet member trying to expand his empire. Those who hold these comforting thoughts should remind themselves that much the same assessment as that of Wsahington has already been made by the Socialist President of France and the Social Democratic Chancellor of West Germany. Two weeks ago the French Prime Minister, Pierre Mauroy, told his country's national defence institute that France "must modernise its strategic nuclear force and its tactical nuclear armaments – without discarding *a priori* the possibility of the neutron bomb."

Although the Communist members of his government have apparently gone along with the French Government's defence policy, one can confidently predict that any attempt by Western countries to increase their military strength will be greeted with massive protests, a luxury unavailable to those citizens of "socialist" countries who are worried about the arms race. Despite these protests the West cannot allow itself to be weaker militarily than the Warsaw Pact. If you wonder why, the answer can be found in Afghanistan, Czechoslovakia and Hungary.

A worldwide enforceable disarmament agreement is now more essential to humanity's survival than ever before. A temporary reprieve will be the only result of our throwing in the towel.

CSO: 5100/7505

INDIA

BRIEFS

KERALA URANIUM FIND--Trivandrum, Sept. 26--An exploratory study has revealed the presence of uraninite, a uranium-bearing mineral, in parts of Trivandrum district. The study, jointly conducted by the Centre for Earth Science Studies (CESS), Trivandrum and Kerala Minerals Exploration and Development Project, had indicated the presence of uraninite in at least four places--Kazhakuttom, Thiruvallom, Venjaramood and Varkala. Prof. C. Karunakaran, CESS Director, told PTI that it was the first time that indication of the presence of uranium in Kerala had been received. The presence of uraninite was detected during a radiometric survey of radio-active minerals with jeep-borne gamma ray spectrometers, he said.--PTI. [Text] [Madras THE HINDU in English 27 Sep 81 p 1]

RADIATION LEAK CLOSES POWERPLANT--New Delhi, 26 Oct (AFP)--A serious leak in one of the units of the atomic power plant in Rajasthan state, about 400 km (250 miles) south of here, has led to its closure, it was reported today. PRESS TRUST OF INDIA (PTI) news agency in a dispatch quoted "knowledgeable sources" as saying the radiation leak was detected between the end shield and calendric and it might take 6 months to one year to repair it. The leak was detected about a month ago. "The approach to the leakage site is very difficult," these sources told the agency. The heat exchange tubes of unit two were also badly leaking and need urgent replacements. This unit had also since been shutdown. The leak in unit one had been caused by injudicious operation of the reactor as a good percentage of its leaking moderate heat exchange tubes are plugged, the agency further quoted the sources as saying. [Text] [BK261558 Hong Kong AFP in English 1021 GMT 26 Oct 81]

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MOTIVES FOR ACCEPTANCE OF SAFEGUARDS EXPLAINED

Buenos Aires CLARIN in Spanish 20 Oct 81 p 8

[Article by Oscar Raul Cardoso: "A Process of Change--Argentina and the Safeguards"]

[Excerpt] The Swiss Sulzer enterprise has begun shipments of material intended for the heavy-water production plant to be built at Arroyito, Neuquen, it was confirmed to CLARIN with evident satisfactions by sources in the CNEA (National Atomic Energy Commission).

This information came almost immediately after the announcement--in Vienna, last week--that Argentina had agreed to place the installations of that plant under the safeguards of the IAEA.

Concerning this international commitment assumed by Argentina, CNEA sources explained that it is "clear evidence that Argentina's nuclear program is designed exclusively for peaceful purposes."

The sources also noted that acceptance of safeguards for the heavy-water plant "does not in any way conflict with the objective of preserving the independence of nuclear development since, in the case of the Arroyito plant, the thing that is placed under safeguards is the new technology actually received."

Both steps--the start of Swiss shipments and the signing of the safeguard agreement --are part of a process of Argentina's nuclear policy adjustment which must be in line with new international conditions; this is why it is a good idea to explain some points.

Fuel Cycle

With the incorporation of technology for the production of heavy water, Argentina will close the fuel cycle necessary to supply the nuclear power plant at Atucha and the two currently under construction (Rio Tercero Dam and Atucha II).

Heavy water is the element that moderates the reaction in reactors which--like those of Argentina, operate on the basis of natural uranium. The zircalloy pipes (or shields), which are used as containments for the fuel element, constitute the third step that closes the cycle and its production is accomplished according to a technology which Argentina already has.

The award of the construction contract for the heavy-water plant was given to the Swiss within the same "package" of projects that included the future nuclear power plant at Atucha II; it will use a reactor based on German technology (KWU [Power Plant Union]).

At the time, the decision made by the national executive--for which the CNEA acts as advisory body--was cause for criticism because the purchase of the plant from the Swiss was handled according to the system known as "turnkey"; this was done to the detriment of a Canadian offer from a country whose technology in producing heavy water is of recognized perfection.

Regarding the safeguards, Argentina agreed to negotiate them within the IEAE only after making it clear that country would not sign the NPT, an agreement which it considers to be discriminatory against the developing countries. While negotiations were already in progress, authorities and the CNEA made it known that many of the demands made by the IEAE--upon the urging of some of its members, such as the United States would continue to be "unacceptable" to the interests of Argentina.

This is why the announcement, last week, did not fail to cause a certain amount of surprise among observers.

Reasons

To understand this acceptance of the safeguards--CNEA sources assured us--one must keep in mind that "the thing that is placed under the control authority of the IEAE is exclusively the plant at Arroyito."

"On repeated occasions," he added, "Argentina has expressed its readiness to place the new technology which is in effect transferred to it under safeguard. The same is not true of what is produced here, or in the case of the promises that are usually made by the nuclear power and that are then not kept."

To these considerations by official sources we must add the fact that conditions on the international market, in which Argentina operates as the purchaser of technology and installations, are changing especially now that Ronald Reagan is in the White House.

In this context it is not inexplicable that Argentina is prepared to adopt decisions which, at another time, it tried to avoid, to say the least, which, as admitted by CNEA sources can include, even before the end of this year, the ratification of the Tlatelolco Treaty (prohibiting nuclear weapons in Latin America).

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CEARA MAY BE SITE OF TWO NUCLEAR PLANTS; RISING COSTS

Cals Explains Plan

Rio de Janeiro JORNAL DO BRASIL in Portuguese 20 Oct 81 p 18

[Text] Brasilia--Minister of Mines and Energy Cesar Cals said that Plan 2000 for projects in the electrical sector, which is in the final phase of preparation by an ELETROBRAS [Brazilian Electric Power Companies, Inc] taskforce, could include two nuclear powerplants of 1.3 million kilowatts each in Ceara if he were to request it.

He said: "Since the transfer of nuclear technology requires the construction of eight nuclear powerplants, why not build two of them in Ceara if the demand justifies it?

Nuclear Complex

He believes that the power from the two nuclear powerplants should be consumed by the uranium enrichment complex which he seeks to have built in his state and also by the regional market, which shows rates of growth higher than the national average at this time.

He revealed that his initial recommendation to PETROBRAS [Brazilian Petroleum Corporation] was that studies be made with respect to having two nuclear powerplants of 600,000 kilowatts each constructed, but the state agency arrived at the conclusion that just to supply the uranium enrichment plant (a uranium concentrate plant with a capacity for 3,000 tons per year and an enrichment capacity of 3 million Separative Work Units per year) the demand would be 1 million kilowatts firm, which means more or less the capacity of a 1.3 million kilowatt nuclear powerplant.

With that total commitment of one entire nuclear powerplant for the nuclear complex, the minister began to believe in the possibility of scheduling two nuclear powerplants of 1.3 million megawatts each for the state. The second powerplant would be justified, not only by the normal demand of the system, but also to insure the uninterrupted operation of the nuclear complex in case of a stoppage for maintenance or the loading of new fuel in one of the powerplants.

Weak Market

Cesar Cals also argues that power consumption in the southeast region is openly declining to the point that even hydroelectric powerplants in the region are being postponed or their work slowed. He cited the fact that Fortaleza is the hub of the electrical system and that there is the technical need for the existence of a large power generating plant for the stabilization of voltages, synchronization, and so forth.

He also revealed that all the eight powerplants included in the nuclear program will be programed within Plan 2000. With respect to the fact that the market is growing at a slower pace than was expected, which could justify the reprograming of the powerplants, the minister said that by programing them for the year 2000, ELETROBRAS is placing the nuclear program in that new situation of the market because the eight units were originally programed for 1990, subsequently postponed to 1995 and now to 2000.

Expensive Processing

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 6 Oct 81 p 33

[Text] The processing of uranium from the Itataia deposit in Ceara, the largest in the country, could cost $120 million if done at Bahia, however, because of the solution adopted with the construction of an industrial complex which includes a nuclear powerplant for supplying power, its cost is calculated at nearly $5 billion. The supply of water--one of the greatest problems for the operation of the manufacturing complex--was discussed informally among technicians of the Ministries of Mines and Energy and of Interior, the subject being the rerouting of the San Francisco River, which crosses the state of Pernambuco and a large part of Ceara. Among the political aspects which emerged in discussing the question, the one of most importance was the idea that "the uranium of Ceara will never be processed in Bahia."

Revealing that information in Rio yesterday, technicians of the nuclear sector added that the Itataia industrial complex will be installed in two phases: the first in the second half of 1983, with the installation of a pilot unit to develop the process of production of yellow cake, remaining in that phase for one year. The second phase would be around the middle of 1985 when production on an industrial scale would begin, taking from 5 to 6 years for completion. Total time for the undertaking to begin operations is foreseen as between 8 and 9 years.

Costs

The pilot unit and the industrial complex will cost, according to the technicians, $600 million at today's prices, including the operational infrastructure (railroad, roads and others) valued at $200 million. In addition to the $600 million, another $3.5 million will be spent in the construction of the nuclear powerplant which will provide the power for the manufacturing center (consumption will be 220-MW per hour). The complex is going to produce phosphate, phosphoric acid and uranium concentrate. The phosphate is associated with the uranium and the separation of the two requires sophisticated equipment and up-to-date technology.

The Other Solution

The same technicians revealed that the first solution, considerably more economically viable, would allow the processing of Itataia uranium for only $120 million. That is how the initial project was conceived: one unit would beneficiate the uranium once it was extracted from the deposit and then the product would be carried by a pipeline to the port of Fortaleza (Itataia is 220 kilometers from Fortaleza). From there the uranium would be shipped to the port of Aratu in Bahia, 25 kilometers from Camacari, where at the Caraiba Metais plant [PETROBRAS Chemical Corporation] it would be processed and the phosphate separated. A unit would be built at the site for the production of one ton of uranium concentrate per year.

The costs would be distributed like this: the Itataia beneficiating plant and the pipeline to the port of Fortaleza would cost $70 million; the pipeline between the port of Aratu and Camacari and the uranium concentrate plant would cost $50 million.

The technicians do not deny that the Itataia industrial complex will be economically viable because of the uranium and the phosphate, however, "it would be infinitely more viable if the first proposal were accepted." On the international market at this time, a ton of uranium concentrate costs $50,000. For each ton of uranium concentrate, 150 tons of phosphate are obtained. Phosphate on the foreign market costs $82,500 per ton. With the production of 3,000 tons of uranium concentrate per year (the production forecast for Itataia) in 40 years the 122,500-ton reserves of the deposit will be exhausted.

Water

The Itataia Complex, say the technicians, will need 50 million cubic meters of water for operating. The water will be stored by means of the construction of gigantic dams and will come from the 15 days of torrential rains which fall in the region per year. The dam will hold 50 million cubic meters because it happens frequently that it does not rain for two or three years in a row. Thought was given to drawing water from underground sources but the research and the equipment to be installed in several wells would be too expensive.

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FRG DEPUTY STATES NUCLEAR AGREEMENT IS GUARANTEED

Rio de Janeiro O GLOBO in Portuguese 27 Oct 81 p 22

[Text] Bonn--Deputy Walther-Leisler Kiep, member of the Christian Democrat Union (CDU), the opposition party, said yesterday that the execution of the Brazil-Germany Nuclear Accord is already guaranteed and that the powerplants should be ready within 3, or at the most, 5 years.

Kiep, who next year is going to run for the prefecture of Hamburg, visited Brazil last week on his own initiative to establish new lines for the policy of economic cooperation of his party.

Returning Sunday night, he declared that he was able to confirm, after the talks he had with officials of the government and the economic sector, that there is no longer any political resistance by the Brazilians to the construction of the atomic powerplants contained in the agreement.

"The construction of the next three powerplants will take place without any reaction," he said.

The German politician liked what he saw in terms of raw materials very much and he advocated a more intensive economic cooperation between the two countries. According to him, Brazil would be willing, unlike other countries, without any nationalistic restrictions, to export an "almost unlimited" quantity.

In the case of raw materials, he referred particularly to uranium and the new reserves discovered, which are of "an especially high quality." In this deal Kiep believes that West Germany could only win because it would reduce its dependence on some countries in obtaining that raw material.

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NUCLEAR KILOWATT TO COST $2,070 SAYS NUCLEBRAS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 7 Oct 81 p 30

[Text] NUCLEBRAS [Brazilian Nuclear Corporations] reiterated yesterday that the cost per kilowatt installed in the nuclear powerplants will be $2,070. This is being questioned by technicians of the sector. Even so the company promised to reveal the latest figures today on the structure of the costs of those units.

The information the agency has provided is that the overall cost of $2,070 results from $1,500 in direct costs and $570 in indirect costs. According to those calculations, the costs of the Angra II and Angra III will be $2.69 billion each.

The various attempts to have the subject clarified in all its aspects in official circles had no effect. The president of the NUCLEBRAS Nuclear Powerplant Construction Corporation (NUCON), Emilio Claudio Leme, said (through his secretary) that he can only make explanations on the subject "with the approval of the public relations section." The same thing happened with the president of NUCLEBRAS Engineering, Inc. (NUCLEN), Ronaldo Fabricio.

NUCLEBRAS public relations officer Cesarion Praxedes, however, was on a trip supervising filming of the installations of the nuclear fuel cycle, returning to the agency late in the afternoon. His deputy, Eduardo Pinto, is on a trip and without the presence of the two, no official will talk to newsmen.

Image

The filming of the uranium concentration plant, which Cesarion Praxedes supervised in Pocos de Calda, and of the fuel element plant (FEC) in Resende, is for the purpose of "improving the image of NUCLEBRAS in the future," declared an official of one of the company's subsidiaries yesterday. In one or two weeks the films will be shown on a television network and the main theaters of Brazilian capitals, showing "the effort and the scope of the work of NUCLEBRAS," added the official.

Itatai

The problem of a water supply for the uranium complex of Itataia, where the largest reserve of uranium in the hemisphere is located, is practically resolved: bids for the construction of Serrote Dam, which will provide all the water required for the complex, are being presented, with the results becoming known in coming days. The information was provided yesterday in Fortaleza by the local manager of NUCLEBRAS, Geologist Geraldo Jose Aires. He added that "the topographic study of the region where the pilot plant for beneficiating uranium is in a very advanced phase."

Although the dates for the beginning and conclusion of the undertaking have not yet been established, the manufacture of the first "yellow cake"--as the concentrates of uranium oxide which will be produced at Itataia are called--is foreseen in 1982. The national budget for next year already includes the money allocated for the construction of the experimental plant but the technicians could not say exactly how much money has been budgeted for the construction of the pilot plant.

8908
CSO: 5100/2027

NO PRECAUTIONARY MEASURES FORESEEN FOR ANGRA I POWERPLANT

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 10 Oct 81 p 31

[Text] The president of the National Nuclear Energy Commission (CNEN), Professor Hervasio de Carvalho, declared in Rio yesterday that reports on damage in 46 American powerplants are "nonsense" by the press, which is not going to change the importance of nuclear power in the world. He explained that he will take no precautionary measures with respect to the reactor of the Angra I powerplant "because all its equipment was already tested in the United States."

Hervasio de Carvalho said that cracks in reactor vessels have already been confirmed in other countries, citing France and Argentina as examples. In Argentina, he said, small cracks were confirmed in the pressure vessel of the Atucha I powerplant, "without major problems for the future."

The CNEN president pointed out that the Angra I reactor vessel was subjected to blast furnace tests "which demonstrated that the material was very good in terms of quality." As far as he is concerned, because of that "there is nothing more to be discussed." He said that within the reactor vessel there are "test samples" which are periodically removed for laboratory analysis and an evaluation as to how the material is withstanding radiation.

Asked about the possibility that the steel used in the vessels in American reactors with problems also being used in the Angra I reactor vessel, Hervasio reacted by saying: "That is a problem of the United States." He became irritated, trying to interrupt the interview when he was reminded that the Angra I vessel was made by Westinghouse, the same company which built vessels and reactors with problems in several powerplants in the United States.

In answer to a new question as to whether there would not be a quality control review at Angra I because of the difficulties confirmed in American powerplants, the CNEN president did not concel his indignation: "That will do no good. We are not going to engage in nonsense. The dogs and jackals bark but the caravan passes." As for the repairs in one of the 46 powerplants with problems in the United States (Indian Point-2) which will cost $100 million, the incident was minimized by the professor: "That is something else that happens rarely."

Certificates

The CNEN president delivered certificates to the first three independent nuclear technical supervisers of Brazil yesterday. They belong to the Brazilian Institute of Nuclear Quality. They are Engineers Claudio Bittencourt de Campos, Paulo Bandeira de Carvalho and Claudio Bueno Guerra. On the occasion, the professor made a defense of "nuclear safety" emphasizing that the basic objective is the reduction "of danger as much as possible." He pointed out the imperious need for quality of materials in the nuclear sector as a "form of affirmation of national prestige."

No Time

The president of FURNAS [Brazilian Powerplants], Licinio Seabra, scheduled a press interview for 1400 yesterday to discuss all subjects having to do with Angra I. However, at the time of the interview, he sent one of his aides to apologize to the newsmen because he did not have the time "to talk to them."

8908
CSO: 5100/2027

NUCLEAR ENERGY USE IN INDUSTRY, MINING, HEALTH DISCUSSED

Santiago LA NACION in Spanish 23 Oct 81 p 8A

[Text] Our country is in a position to apply atomic energy in industry, mining and health, depending on the needs of these sectors and the government's decisions in this regard. In any case, the National Energy Commission is ready to proceed with the use of this energy source.

This was reported by the executive director of the Chilean Nuclear Energy Commission, Col Juan Bautista Mir Despouy, in his analysis of the 16-year history of that commission.

If our level of nuclear energy development is compared with that of other Latin American countries, "rigid parallels cannot be established," said the executive. In the specific cases of Brazil and Argentina, he said, "these are two nations that have many years of experience in research and the practical utilization of the resource."

At the same time, there is a great variety of fields in which nuclear energy can be of use, which implies a division of the levels at which comparisons can be made.

If the use of atomic energy in the production of electricity is analyzed, "our country is at a level where up-to-date studies are available for any decision the government may adopt for the incorporation of this resource in national development."

Different Situations

In the cases of Argentina and Brazil, indicated Col Juan Mir Despouy, the situations are different as far as the production of electricity with atomic energy is concerned.

Argentina must develop atomic plants for the production of electrical energy, because it does not have sufficient hydroelectric resources. In this regard, Chile does have sufficient resources, both renewable and non-renewable, to produce electricity.

Brazil is in a similar situation, in that it also needs atomic plants because of its vast territory and the paucity of natural sources of electrical energy.

In nuclear medicine, our country is at the forefront of other nations. There are many radiodiagnosis centers in Chile. Since 1972, remarkable progress has been made in both the public and private sectors.

As for mining, Chile is also in a very good position, considering that we are a mining country par excellence. The Chilean Nuclear Energy Commission is providing strong technical support for improving mining processes in the country.

Agroindustry

With regard to applications in agroindustry, our country is also in a favorable position. Many studies and research projects have been conducted in this field. All techniques and measures are at the users' disposal, and can be utilized at any time.

All nuclear reactors, without exception, are subject to international safeguards through the International Atomic Energy Organization, and are normally inspected according to how much atomic fuel they use. Thus, proliferation can be prevented and controlled, and health-threatening leaks can be avoided.

Lt Gen (R) Herman Brady Roche, chairman of the Board of Directors of the Chilean Nuclear Energy Commission.

8926
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INTER-ARAB AFFAIRS

STUDY EXAMINES POTENTIAL FOR NUCLEAR PROGRAM

Beirut AL-SAFIR in Arabic 20 Sep 81 p 14

[Article by 'Adnan Mustafa: "A Comprehensive View of the Unified Arab Nuclear Fuel System"]

[Text] In the past years - 1970, 1975 and 1980 - the Arab world consumed the following quantities of electricity: 29 trillion watt-hours, 43 trillion watt-hours and 85 trillion watt-hours respectively. These quantities were consumed in the eastern and western areas alike. It is expected that electric generating capacity will rise from 28 gigawatts in 1980 to 65 gigawatts in 1990, then to 120 in 2000. Hydroelectric power is expected to rise to about 8 gigawatts by the end of this century. The joint Arab nuclear power project can start actual production in the mid-nineties, that is, when the method for generating by means of petroleum products, oil and gas starts [sic].

On the basis of the foregoing, and on the basis of Arab uranium reserves, the Arab world can preserve a high degree of independence in this field, especially if a united Arab organization is established to produce nuclear fuel. This study shows the time period the Arab world will need in order to produce nuclear power from the 20 proposed nuclear plants by the end of the century.

The whole world is suffering from the specter of a punishing international energy crisis. Most industrial countries have resorted to starving their economic development plans as well as plans to raise the population's economic standard of living in order to acquire more oil at reduced prices. It is clear that the disorganized spread of oil consumption and the rise in the rate of consumption have hastened the approaching depletion of this source of energy, which is expected to occur in the next 3 decades. In another area, most developing countries in the world will be facing a crisis in the depletion of the sources of existing energy in their territory. These countries will enter the first decade of the 21st century empty-handed, except for some remaining sources of energy which will be encumbered with the burdens of projects for secondary energy production. Studies show that the developing countries' constant desire to seek new ways of producing energy such as by nuclear power, always faces attempts at obstruction from the major nuclear countries, which managed to mobilize the nuclear power they need a long time ago.

In any event, the specter of the constant fear of complicated problems related to the transfer of nuclear technology has not prevented some developing countries such as Brazil, India and Pakistan from taking practical steps to build their own nuclear power generating plants. Rather, to the opposite, these complicated problems have helped give some developing countries a picture of the future that encourages them to meet their aspirations to acquire greater electric power.

Since the Arab world is part of the developing world, it is facing the same problem and is thinking of crystallizing its needs in various ways. In the mid-seventies, some Arab countries expressed an actual desire to possess nuclear technology, and it is expected that this desire, as well as Arab need for nuclear power, will make it necessary to produce 20 gigawatts of electric generating capacity, which will basically rely on the Arab nuclear power projects organized a year ago.

In the light of experience which has taken form in the world following the emergence of nuclear industries, the degree of stability of any nuclear project is considered subject to numerous practical items of evidence, including, for example, the newness of the nuclear project, the type and mode of operation of the generating reactors used, and the effect on uranium requirements. There is supposed to be a total division and independence between the issue of the supply of uranium ore and the effectiveness of the source of the atom, the oil relied upon [sic].

Studies have recently showed that the uranium reserves in the Arab world come to about 60,000 tons while it is possible to produce about 3.6 million tons of uranium from wastes that are separated after producing phosphoric acid, using the tremendous volumes of phosphate reserves in Mauritania, Morocco, Algeria, Tunisia, Jordan and Syria. On the basis of all this information, there is a desire to create a unified Arab nuclear fuel system, and the hope is that this type of proposal, which is to be considered a strategic turning point contributing to supporting the Arab nuclear industry, will be realized through attainment of Arab independence of original places of uranium processing.

The Arab World's Need for Electricity

It is difficult to ascertain the unified Arab system's ability to provide fuel and to determine the amount of nuclear fuel that is needed; numerous factors together keep us from setting forth comprehensive detailed recommendations. Among these factors, for example, are the fact that the energy sector has recently taken form in the Arab world, a lack of clarity on requirements bearing on Arab energy in the limited and broad scales, and the amount of lost energy related to aspects of Arab development plans. However, some of these factors were dealt with in the seventies by some Arab thinkers, organizations and also Arab governments, and many positive recommendations were presented at the Castrap conference (Rabat, 1976), the first Arab energy conference held in Abu Dhabi in 1979, and the fourth Arab conference on primary materials held in Amman at the start of this year.

Guided by these pioneering ideas, we have decided to follow some purely experimental approaches to cover Arab energy requirements.

Based on expectations on the volume of energy consumption in 2000, as well as al-Khatib's statistical study (1980), one can state that the volume of energy required for consumption in 2000 could come to about 120 gigawatt hours per year, 8 gigawatt hours of which will be produced by hydroelectric power and another 92 of which will be produced by ordinary familiar means. We are totally confident that nuclear power will be able to produce the amount of energy required in 2000. If we take the probable development of Arab nuclear power into consideration we can anticipate greater attention to nuclear power in the Arab world in the second half of this decade. We also hope that this interest will lead to a commitment to introduce nuclear power in the period between 1985 and 2000. If matters proceed as planned after 1985, the Arab world as a whole will on the one hand, be able to operate close to 20 nuclear plants with a capacity of 1 gigawatt each in 2000, when the Arab world will know what its uranium reserves are, and on the other these nuclear plants will help the Arab world hold its oil and gas in reserve for use in other development projects.

Based on the increasing rise of nuclear power plant construction costs, the Arab world will be able to protect its tremendous savings in foreign banks from depreciating in value by developing joint Arab projects to build nuclear power plants. For example, it would have been possible to save $650 million had nuclear reactors producing 1 gigawatt been built at the beginning of the seventies. In any event, if we assume that the Arab world has undertaken to build a nuclear plant producing 20 gigawatts in the mid-eighties, that means it will be necessary to invest $25 billion between 1985 and 1995. It will be useful to recall that this amount is roughly equivalent to the value of the revenues from 40 days worth of oil exports at a level of 12 million barrels a day in 1985. In most cases one can consider that the recommendation of building a joint Arab nuclear power plant producing 20 gigawatts will be a great success, for the following reasons: first, because by the end of the 20th century it will be supplying the Arab world with a basic new source of energy, and second, because it will make it possible to satisfy the needs that are now met by burning half a million barrels of oil a day; the consumption of that sort of amount of oil will cost about $120 billion in 1985-1995 going by the oil prices that will prevail in that period.

3. [sic] The role of joint Arab nuclear power: a comprehensive view:

Most Arab countries are orienting themselves in various ways toward the acquisition of numerous forms of nuclear power industries. These countries had realized some successes by the end of the seventies. In any event, until this conference (the first Arab nuclear power conference in 15-19 June 1981), which is to be considered a sign of the start of a new era in the growth of power in the Arab world, these countries had not built what had been expected, for a simple reason, which was that they were working individually, and every country was devoting its resources to serving its interests alone. This failure was the result of two causes:

First, the nuclear power industry requires complicated technology and very great capital. No Arab country has yet been able to satisfy the simple initial economic and technological requirements for dealing with this matter.

Second, in view of the fact that the Arab countries are going through a situation where they form separate entities, all of these countries will lack the support of the oil power that exists in the region. If the countries had started thinking about nuclear projects that could have led to a state of preliminary Arab development, that would ultimately have come up against significant obstacles resembling those that have been encountered in other less complex industries.

One can consider that the first difficult lesson of the first nationwide experiment was a major failure in advancing the principles of nuclear industry in the country.

In addition, the entire Arab world, for 2 decades, has fallen behind the front line of international nuclear power development. By continuing in the same direction, one can provide an answer to all questions and proposals that might be presented in the future.

The choice of reactors:

The basic reactor in the process of nuclear power production must be considered. The reactors operating in the world at the present time use uranium for fission and uranium and thorium for splitting atoms. The nuclear fuel cycle is composed, for instance, of reactors which through fission create materials that are used as fuels in nuclear reactors; mining uranium and processing it into reactor fuel constitute the front end of the fuel cycle, and the final step consists of processes which are concerned with the storage of spent fuel and the management of waste treatment and disposal. The volume of uranium needed to produce a unit of energy differs according to the specifications of the reactors and the fuel cycle, according to the volume of U-235 that is replaced in the enrichment process, and according to the degree by which the output of the fission is moved and the degree at which the fissionable materials are replaced by the spent or reused fuel.

At the present time there are 555 commercial nuclear projects producing a total of 496 gigawatts of power distributed among 32 countries in the world. These plants are considered to be of the following types: PHW, BWR, PWR, AGR, MAGNOX and CANDU. The first three types are considered the most common in nuclear reactor markets. The choice of any of these reactor types can benefit the consumer and enable him to do without any foreign sources for financing fuel in the long range, provided these reactors operate on natural uranium and sources of uranium ore. In any event, the choice of any of these commercial types must be founded on two main considerations:

First, the Arab world's possesion of nuclear reactors, a factor which is essentially connected to volatile conditions in the Arab nation and the world. It is very important to note the competitive ability of atomic industry organizations in Canada, France, Japan and West Germany. The umbrella of this competition has opened wide, so perhaps the Arab world can proceed to demand that these countries supply nuclear reactors, as many developing countries have.

Second, the availability of the technology which basically influences the reactor's ability to function. In the realm of research into the basic reasons for the withholding or inavailability of commercial nuclear reactors, Sarry and Thomas, in 1980, made a concentrated study on the operating power of nuclear reactors in use outside socialist countries. The modern PWR and BWR reactors have shown that the capacity of reactors varies in accordance with each country that uses these types. One of the most important conclusions that Thomas and Sarry reached reveals that reactors operating at 70 percent of capacity give satisfactory results and that numerous countries have managed to achieve self-sufficiency by means of PWR reactors. Low output in BWR reactors has been observed in all countries except Switzerland.

A comparison of fuel costs based on current prices and the average cost of producing power by means of PWR, CANDU, PHW and BWR reactors on a worldwide level shows the PWR reactors' relatively superior performance from the economic standpoint. The French have managed to build LWR reactors in 6 years and thus have managed to outstrip the worldwide average, which is 12 years.

At any event it seems that the choice among various types of PWR reactors depends essentially on the newness of the type offered for sale. Nonetheless, Thomas and Sarry conducted a comparison of the operating records of two types of reactors in the United States, the BWR and PWR, and made a comparison of functioning of both types in the same period. They found that the new types provide an output eight to 10 /times/ greater than what the old types offer, and the degree of difference has usually been high. This can be explained by increasing interest among American organizations and factories, and engineering design organizations, to develop reactor levels and designs to reduce the volume of equipment failure and to reduce difficulties and losses. There is a tendency in the United States to establish the anticipated level of power production of nuclear plants at 1 gigawatt in the case of PWR reactors. Therefore, the selection of this type of reactor, in the light of a 20-gigawatt production capacity in the case of the unified Arab nuclear project, cannot be a justification, at the present time at least.

Providing the Reactor

In order to provide the 20 reactors proposed to produce 20 gigawatts within the unified Arab nuclear program, three things will have to be taken into account:

First, reactors of 1 to 3 gigawatts are considered the types most suitable for the Arab world in the period 1985-2000, based on the increased demand for electricity in the Arab world in the past period. Claverie and Dupas expect that 3- to 5-megawatt reactors will be more commonplace in the first half of the coming century.

Second, in spite of the low maximum installed electric power production in the Arab world (no more than 100 megawatts), increasing attention is being given to hooking up the two systems in the western and eastern regions by increasing the maximum installed electric power production to about 400 kilowatts /sic/. If these goals are met in the eighties, the two systems will then be able to bear the load until the generation of power from nuclear plants starts.

Third, the provision of reactors could influence possible developments that can occur by chance. Roberts, in 1979, discovered a characteristic of experimentation which was that learning perhaps occurred more rapidly when one had access to more than one reactor in numerous places.

Taking the three abovementioned points into consideration leads one to the /question of/ providing the 20 proposed reactors in Morocco, Tunisia, Iraq and Saudi Arabia. Algeria can host a united Arab center for mining and processing uranium.

The front end of the nuclear fuel cycle (the nuclear fuel cycle front end -- NFC-FE):

In the first stage of the NFC-FE, it will be necessary to make a reasonable tabulation of Arab uranium reserves. Mustafa and Jasim, in 1981, recently made an investigation into this issue and produced the following conclusions:

First, the rate of investment in uranium sources amounting to about 60,000 tons comes to $90 to $100 per kilogram of uranium.

Second, one can count on an addition 3.6 million tons of uranium that can be extracted from phosphate as an auxiliary or additional source.

Third, other additional sources, such as those derived from the roots of trees, sandstone and calcium rocks, can be estimated at about 9,000 tons.

Fourth, one can consider that the process of exploring for uranium sources that took place in the Arab world in the mid-seventies was an introduction to the discovery or evaluation of future activities.

In any event, a reactor of the LWR type producing 1 gigawatt will need close to 195 cubic tons [sic] of natural uranium per year in the complete fuel cycle and 160 cubic tons for regeneration. The proposed program could need about 59,000 cubic tons over 15 years of production and therefore Arab exploration plans must be enlisted in the service of future requirements.

One can say that a unified Arab nuclear fuel company could consolidate the exploration program as well as preparations for mining. Such a company could see the light of day by 1985, in view of the availability of Arab and Islamic monetary resources for allocation to this field. This company could assume the form of other operating joint Arab projects, such as OAPEC and [ventures in] many other industries. One must strive to grant the company adequate authority to carry out the following tasks:

First, adopting measures that will guarantee that uranium exploration activies in the Arab world are reinforced. Aid from the Arab Organization of Natural Resources (AONR) will be of utmost importance in the early years. Here it is necessary to refer to the efforts of the fourth Arab conference on natural materials sources that was held in Amman at the beginning of this year, declaring its support for the AONR's directives and for the development of uranium exploration activities.

Second, starting to use most of the uranium reserves, beginning with Mauritania, Somalia and some other Arab countries, with the help of the Arab Mining Company (ARMICO).

Third, starting to order and acquire nuclear fuel technology under the supervision of pilot Arab nuclear centers, such as the Algerian center (the Algerian Nuclear Center for Science and Technology, CSTN).

Fourth, establishing firm relations with IAEA, the Uranium Institute and all existing nuclear fuel agencies in developing and industrial countries.

Attaining effective cooperation with some of these organizations will help integrate the unified Arab nuclear fuel cycle in a short time.

Perhaps it is unwise to be adventurous at the present time with the large amounts of money [that will be needed] as a reserve for a consolidated Arab nuclear company, since that is to be considered outside the priorities that must be followed in this sphere. Laying stress on these priorities could require field studies that may be performed, or embarked on, by the first Arab nuclear power conference, and it will be possible to provide appropriate mutual financial support to finance the study from the Arab Fund for Social Development and Economic Development, or the Arab Bank.

Lastly, the Arab Organization of Natural Resources can keep abreast of the proposed study in the near future by itself, or in cooperation with OAPEC, as well as the Algerian Center for Scientific Studies. Here one can say that the recommendation to establish a consolidated Arab nuclear fuel cycle has started to flesh itself out. (A study presented at the first Arab conference on nuclear power, Damascus, 15-19 June 1981.)

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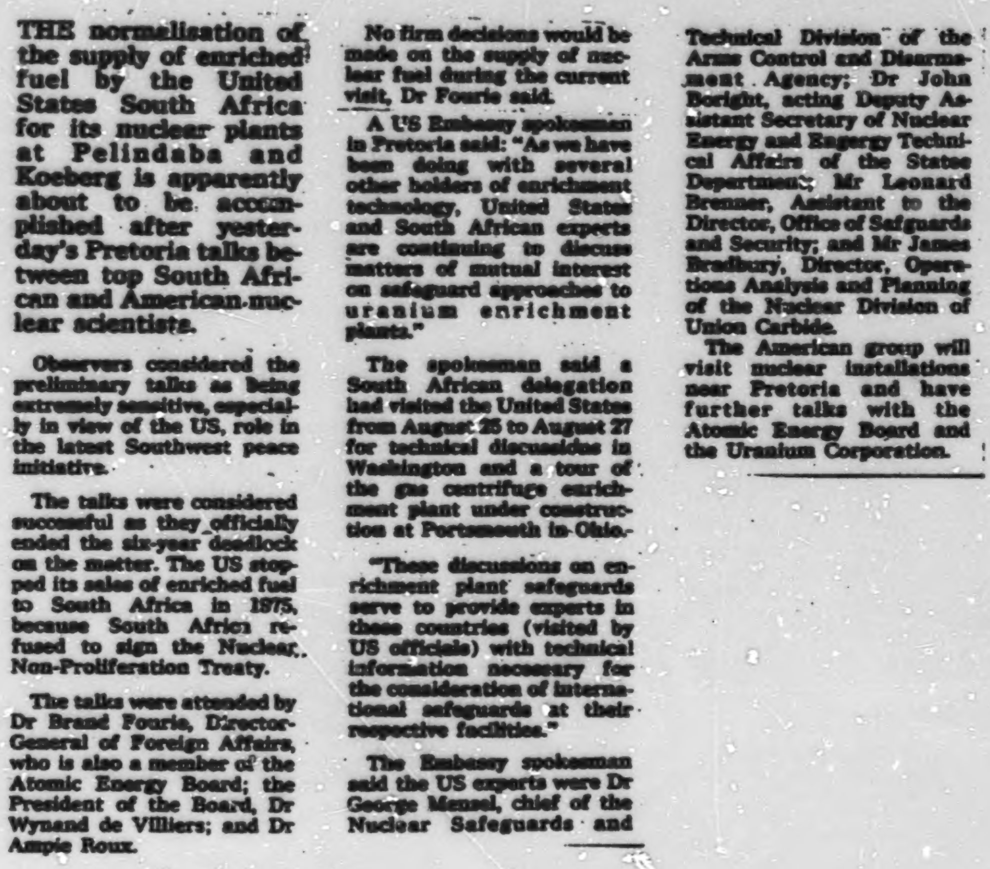
TALKS AUGUR NORMALIZED ENRICHED FUEL SUPPLY

Johannesburg THE CITIZEN in English 22 Oct 81 p 3

[Article by Jaap Theron: "Top Nuclear Talks May Unlock Supply"]



[Text] **THE normalisation of the supply of enriched fuel by the United States South Africa for its nuclear plants at Pelindaba and Koeberg is apparently about to be accomplished after yesterday's Pretoria talks between top South African and American nuclear scientists.**

Observers considered the preliminary talks as being extremely sensitive, especially in view of the US, role in the latest Southwest peace initiative.

The talks were considered successful as they officially ended the six-year deadlock on the matter. The US stopped its sales of enriched fuel to South Africa in 1975, because South Africn refused to sign the Nuclear Non-Proliferation Treaty.

The talks were attended by Dr Brand Fourie, Director-General of Foreign Affairs, who is also a member of the Atomic Energy Board; the President of the Board, Dr Wynand de Villiers; and Dr Ampie Roux.

No firm decisions would be made on the supply of nuclear fuel during the current visit, Dr Fourie said.

A US Embassy spokesman in Pretoria said: "As we have been doing with several other holders of enrichment technology, United States and South African experts are continuing to discuss matters of mutual interest on safeguard approaches to uranium enrichment plants."

The spokesman said a South African delegation had visited the United States from August 25 to August 27 for technical discussidns in Washington and a tour of the gas centrifuge enrichment plant under construction at Portsmouth in Ohio.

"These discussions on enrichment plant safeguards serve to provide experts in these countries (visited by US officials) with technical information necessary for the consideration of international safeguards at their respective facilities."

The Embassy spokesman said the US experts were Dr George Mensel, chief of the Nuclear Safeguards and Technical Division of the Arms Control and Disarmament Agency; Dr John Boright, acting Deputy Assistant Secretary of Nuclear Energy and Engergy Technical Affairs of the Statse Department; Mr Leonard Brenner, Assistant to the Director, Office of Safguards and Security; and Mr James Bradbury, Director, Operations Analysis and Planning of the Nuclear Division of Union Carbide.

The American group will visit nuclear installations near Pretoria and have further talks with the Atomic Energy Board and the Uranium Corporation.

CSO: 5100/5604-E

NUCLEAR PLANT TO PLACE WASTE FILTER MASSES, PARTS IN SEA

Stockholm SVENSKA DAGBLADET in Swedish 17 Sep 81 p 7

[Article by Dag Bjerke: "Undersea Silos for Nuclear Power Waste"]

[Text] The nuclear power industry will bury radioactive filter masses and components from Swedish nuclear power plants 50 meters below the bottom of the sea outside Forsmark.

This is not where the spent nuclear fuel is finally to end up, however--that question is far from decided.

The final storage place now to be blasted out 1,300 meters northeast of Stora Asphallan outside Forsmark nuclear power plant will finally handle the circa 90,000 cubic meters of waste which will originate in the operation of allnnuclear power plants in the country.

The waste consists of polluted filter masses used to purify the water circulating in the reactor. The dirt attached to it is radioactive and must be shielded from the world.

Further, there are worn out components; boxes to hold the nuclear fuel in place in the hearth, control rods to control the nuclear reaction, and other things that must be replaced at intervals of 5 to 10 years.

All this must first be encapsuled in concrete or barrels of asphalt, to be sent 50 meters down into the rock below 6 meters of water.

The water depth of 6 meters was selected because it corresponds to the natural rise of the land in a period of approximately one thousand years--just the length of time thought necessary to keep the storage pits well separated from the atmosphere. After that time most of the radioactivity has worn off.

The power industry, which presented these plans to a symposium on reactor waste in Goteborg from Monday to Wednesday, has also mapped the rock strata under the water with the idea in mind of later developing this storage place for the purpose of handling radioactive grinding wastes when all of Sweden's 12 reactors have been in service through the year 2010.

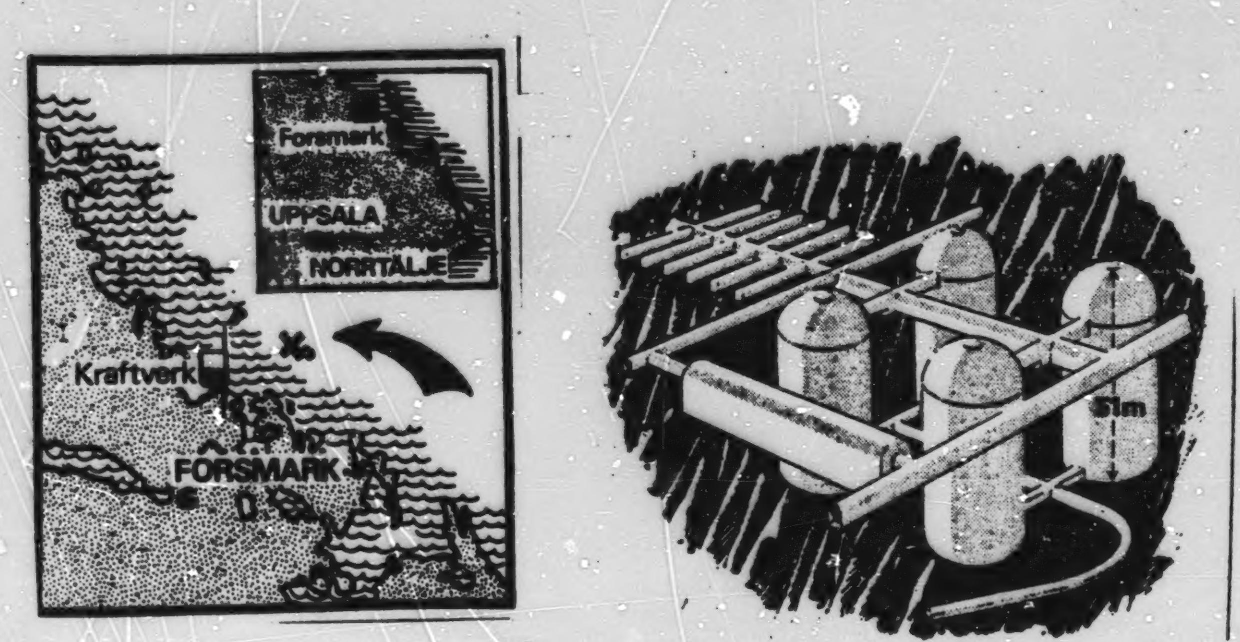
Containers Cracked

At the symposium the problems were reported which the Oskarshamn plant had encountered at the first reactor with this type of filter mass during its first 6 years of operation, 1972-1978.

Too much water in the "grout' made it swell so much that in several cases it burst the concrete containers in which it was contained.

The mishap affected 50 to 100 cubic meters of waste matter. The ruptured and cracked vessels have now been enclosed in steel containers, and a number of such steel containers are kept in the event that more of the old containers should begin to crack. The power production industry now thinks it has solved the problem of fermentation, which has engaged the attention of an inner circle of nuclear power experts during the late 1970's. A new method of reducing the risk of swelling and volumes of filtering masses was also presented during the symposium. The planned reactor waste storage site may be completed in 1988. Construction costs are estimated at 600 million kronor and operation cost at a total of 400 million.

During the construction period there will be jobs for 50 rock workers and at the most, in 1987, for over 200 concrete workers. The operation will employ 25 persons.



In the Forsmark project radioactive waste from the nuclear power plant will be stored in enormous concrete silos to be blasted out of rock 50 meters below the bottom of the sea (at the X on the map) northest of Stora Asphallan. The waste will be carried there through a 1400 meter long underground tunnel. 1) Power plant.

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CSO: 5100/2003

DEBATE CONTINUES ON BUILDING NEW NUCLEAR POWER PLANT

Hamburg DER SPIEGEL in German 12 Oct 81 pp 210, 212

> /Text/ Because of stubborn resistance by the public, the energy industry wants for the first time to give up on construction of a nuclear power plant -- but only if the state pays compensation for the outlays made so far.

Nuclear power plant opponents from northwestern Switzerland warned the government in Bern that construction of such a plant on the Rhine /River/ at Kaiseraugst, 10 km west of Basel, could go through only "with massive police protection," not to mention "use of the army."

Some politicians share this view: As long as 2 years ago, the National Council -- predominantly in favor of nuclear power -- for the same reason called on the government in Bern to study the financial consequences of giving up on Kaiseraugst.

In the summer, shortly before the end of the approval process, members of parliament wrote to Bern that "a yes to Kaiseraugst by the Federal Council (the government) would be so politically inflammatory that the consequences for domestic policy would be incalculable."

To be sure, the consequences are also incalculable if Switzerland waives construction of this reactor. In that case there would not necessarily be the threat of civil disobedience with mass tax rebellions and refusal to serve in the military, let alone violent opposition, but there would indeed be a raid on the federal treasury.

This is because the Kaiseraugst Nuclear Power Plant AG /Inc/ -- an amalgamation of 10 Swiss and 2 German partners (Baden Works AG and Rhenish-Westphalian Electricity Works AG, each with 7.5-percent shares), as well as 1 French partner (Electricite de France, with 20 percent) -- wants to let the project be bought out: the greater the speed and the higher the price, the better: Public opposition has become too deep-seated for the companies.

For more than 10 years now, the people living around Basel, in upper Alsace and southern Baden have been resisting the nuclear power plant on the Swiss side of the border. Kaiseraugst -- like Wyhl for the residents of Baden -- has long since become a symbol of the battle against big technology and gross waste, destruction of the environment and the dangers of radiation.

The voters in the cantons of Basel-Stadt [urban] and Basel-Land [rural] even bound their authorities by law to oppose all nuclear installations on their own territory and its surrounding areas. This protest, supported repeatedly through construction site takeovers and plebiscites, wore down the nuclear industry.

They could not knuckle under publicly, however, for in the interim they have spent more than a billion francs on the 925-megawatt nuclear reactor — blindly, i.e., solely on the basis of a site permit.

Kaiseraugst's Director Ulrich Fischer needs construction authorization from the Federal Council to obtain the largest possible amount of compensation; only then is he willing to declare that public opposition has made construction impossible.

Then again, Fischer might not want to remain totally silent about his willingness to pull out, because then he would have to fear that the federal government might feel constrained simply to deny a need for electric power from Kaiseraugst — a circumstance that would preclude any construction authorization and could mean the end of additional nuclear power production in Switzerland.

Nor did Energy Minister Leon Schlumpf want to obstruct the future of nuclear power, so he went along with Fischer's game of poker: He was hoping to force a voluntary withdrawal by the Kaiseraugst AG by imposing additional safety conditions and stringent emergency warning plan regulations. But Fischer swallowed all of the new conditions.

In a second phase of negotiations conducted in strict secrecy, Fischer offered to waive construction if he could be assured of compensation — allegedly between 600 million and 800 million francs. Minister Schlumpf was forced to pass, noting that he had no legal grounds for making such a promise, this being the prerogative of the Federal Court.

When the negotiations then broke down, the Bern government made up its mind to end the on-again/off-again situation and come to a decision. But it never came to that, for only 3 days before the decisive cabinet meeting, the Kaiseraugst AG suddenly started the million-franc roulette game all over again with a letter.

In his four-page message, Fischer reiterated his request for construction authorization, confirmed the failure of the waiver negotiations — and surprised the government with the announcement that he now intended to negotiatiate on withdrawal directly with the parliament.

"This floored the Federal Council," said an insider in describing the effect of the letter. The ministers took Fischer's new offensive to be an attempt to put pressure on them: Because the manufacturers of nuclear power were apparently less interested in the construction of their power plant than in exorbitant compensation, they were now counting on the parliament, where energy industry boards of directors are especially heavily represented.

Instead of saying yes to the need, thus to the construction authorization itself, and passing the Kaiseraugst case on to parliament (which has the final say under Swiss nuclear law), the Federal Council declared itself unable to issue a construction permit to the Kaiseraugst AG — which it actually was obligated to do, since it feels there is a demonstrated need for a 1,000-megawatt nuclear reactor in the 1990's.

According to Minister Schlumpf, the applicants were invited to submit to the Federal Council an explicit waiver offer that could be passed on to parliament.

Total perplexity was the result of this "smoke bomb" (as the Zurich TAGES-ANZEIGER called it): Fischer felt tricked; according to a deputy, there was "head-shaking, nothing but head-shaking" in parliament, which had just convened in Bern; opponents of nuclear power stormed that the government was holding resolutely to its nuclear policy, while proponents of nuclear power complained of the Federal Council's "weakness in making decisions."

In the meantime, it is dawning on many a Swiss citizen that their government acted rather cleverly with its oblique "nondecision" (according to Kaiseraugst's Fischer): By virtually forcing the Kaiseraugst AG to submit a waiver offer, it does not need to issue a construction authorization.

It thereby gains time and possibly avoids the danger either that parliament, with its numerous representatives of the energy industry, will approve the construction decision purely to spite the Swiss in the northwestern part of the country, or that the Kaiseraugst AG will receive generous compensation.

7458
CSO: 5100/2021

BRIEFS

URANIUM DEPOSITS--Sebinkarahisar (Giresun), 27 Oct (AA)--Rich deposits have been discovered in Sebinkarahisar, near Giresun by a group of scientists from the Middle East Technical University and the state-run organization "Institute of Metal Researches." Sebinkarahisar deposits constitute 80 percent of uranium deposits in Turkey, university sources said. [Text] [Ankara ANATOLIA in English 1150 GMT 27 Oct 81 TA]

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 124

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1 December 1981

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 124

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PAPERS HAIL BANGLADESH-U.S. NUCLEAR AGREEMENT

'BANGLADESH OBSERVER' Editorial

Dacca THE BANGLADESH OBSERVER in English 19 Sep 81 p 5

[Editorial: "Nuclear Energy"]

[Text] Energy is the most important factor in the development process of a country. The same is needed for augmenting the availability of goods and services and advancing the growth of the economy. And the availability of energy from conventional sources is not unbounded. Some of the sources are basically expendable and to that extent less dependable in character. Fossil as a source predominates the scene although it is circumscribed with the risk of being exhausted. Even the renewable sources are in the wane, despite all that is done in the name of preservation and the activities thereof. Presumably the impact of civilization is felt more and more in the form of loss of renewable sources of energy like forestry. This is due to inherent difficulties in the preservation of such sources and the reliance on nature for the continued supply of such sources. In the context of depletion of conventional sources relevant authorities everywhere have looked for alternative sources including atomic energy.

Authorities in Bangladesh have taken into consideration the need for continued supply of energy and the possibility of exploiting non-conventional sources. The realization is based on non-availability of conventional sources, excluding gas and the urgency to look for alternative sources including atomic energy. The adoption of a development project for nuclear power station quite some time back reflects the awareness on the part of the authorities. But the support for such a non-conventional source of energy has been inadequate so far. Despite that the Atomic Energy Commission has done quite a bit of good job and succeeded in putting atomic energy to peaceful use. The inadequacy of research facilities will however be largely met if the atomic research reactor is installed in the new site near the capital. And the signing of an agreement between Bangladesh and the U.S.A. for cooperation in the peaceful uses of nuclear energy will remain a major milestone in this direction.

This agreement will facilitate the exchange of technical equipment, knowledge and expertise for ten years. And the exchange is bound to have sizeable contribution to the overall development of research activities in the country. As it is, the agreement provides for the supply of research reactor, which will enable the scientists to ensure use of nuclear power for energy, radioisotopes in medicine, agriculture and industry. In addition, disposal of nuclear fuel and exploration and development of nuclear minerals may be facilitated under this agreement. And all this will widen the scope of peaceful uses of atomic energy for ultimate benefit of humanity. In the given context of Bangladesh, where many are found to be outside the ambit of development, the use of nuclear energy for expanding the supply of goods and services will usher in a new era of growth and prosperity.

As it is, the nuclear energy is now under the overall monitoring of the International Atomic Energy Agency. Bangladesh is a signatory to the international treaty of non-proliferation of nuclear weapons, and the entire gamut of activities concerned under the present agreement will be for the peaceful uses of nuclear energy. And Bangladesh needs to use nuclear energy for facilitating production in various sectors. If the entire programme is implemented there is possibility of increasing production of food, controlling health hazards, and generating power which this country needs both for augmenting development and for reducing dependence on expendable but costly source of energy. It is hoped that the agreement will herald yet another phase of peaceful use of atomic energy for a populous country poised for growth.

'BANGLADESH TIMES' Editorial

Dacca THE BANGLADESH TIMES in English 19 Sep 81 p 5

[Editorial: "Nuclear Accord"]

[Text] U.S.-Bangladesh technical and scientific cooperation has added a landmark to it with an 'umbrella' agreement concluded between the two countries for substantive collaboration in peaceful uses of nuclear energy. This positive step has exemplified the resolve of two nations to herald a new era in their bilateral relations harnessing such an instrument to the use of nuclear energy in the service of humanity. The accord, operable within the high international principles as enunciated by the IAEA, is accompanied by a confirmation of an earlier impression given by the U.S. that assistance to Bangladesh will continue without any abatement.

Bangladesh's steadfast commitment to contribute her mite to make the world a place where mankind could live in an atmosphere of peace and economic development is widely known. Similarly familiar must be many countries of the world with our unrelenting and diligent pursuit of economic goals which cannot be translated into realities without rapid breakthroughs made in the fields of agriculture and industry.

The nuclear cooperation accord has a time coverage of ten years which could be extended further, both sides desiring. So, timewise the agreement has a good spread and going by the elements contained in it one gets at the full meaning of the term 'umbrella' given to the instrument.

The vital parts to the agreement have been envisaged in such a way that the entire gamut of peaceful uses of nuclear energy has been encompassed. A new vista for exchanges of technical knowledge and expertise has opened with Bangladesh poised to reaching a forward foothold in substantialising and diversifying the nuclear energy uses attuned to her context and with adequate safeguards against radioactive fallouts. The accessibility to latest information in the field will be of tremendous value to Bangladesh which, as it is, has been a beneficiary of the IAEA support towards developing her nuclear energy. All this will help us consolidate and further the limited advances we have made in the use of radio isotopes. Production and utilisation of this material in medicines, agriculture and industry are covered by the accord with the U.S.A.

The stress given on nuclear power generation is obvious from the measures incorporated to accelerate the establishment of a key research reactor at Savar to be followed by the designing and development of other generation units.

Specially notable is that feature of the accord which concerns exploration and development of nuclear minerals in Bangladesh. Our coastal-belt and the new marine accretions are said to be endowed with them.

CSO: 5100/7010

BRIEFS

SCHOLAR ON ATOM BOMB--Chandigarh, Oct. 10--India need not go in for the manufacture of the atom bomb because its conventional defence forces do not lack credibility vis-a-vis China and Pakistan. The atom bomb will neither add prestige nor extend her area of influence. These are the views of Mr Rakesh Kumar Datta, a research scholar in the department of Defence Studies, Punjabi University, Patiala. He has explained his stand in a paper submitted to an international conference held in London this year. The paper points out that India is rich in atomic minerals and has the world's richest reserve of thorium and a good quantity of uranium. During the comparatively brief period of its functioning, the Bhabha Atomic Research Centre recorded remarkable achievements in various aspects of nuclear technology. She has four research reactors, a plutonium plant and has built several atomic power plants to use nuclear technology for generating electric power and heavy water plants. The country has made considerable progress in delivery systems. The electronic division of the Bhabha Atomic Research Centre is believed to be capable of designing and producing command and control equipment in a limited way. Considerable attention is being paid to missile development though large sums of money are required for research and development. The equatorial rocket launching station has successfully fired some indigenous rockets. [Text] [Calcutta THE SUNDAY STATESMAN in English 11 Oct 81 p 7]

NUCLEAR FUEL COMPLEX--Hyderabad, Oct. 12--The Centre has given clearance to the Nuclear Fuel Complex of the Department of Atomic Energy to procure and install equipment for the production of 2,000 tons of stainless steel tubes with an investment of Rs 13 crores, reports UNI. This was disclosed by the chairman of the Atomic Energy Commission Mr H. N. Sethna, while inaugurating a symposium on "manufacture of seamless ball-bearing steel tubes". at the NFC here today. He said the Government had proposed that the NFC should diversify and take up production of 21,000 tons of ball-bearing seamless steel tubes and 3,000 tons of oil-drill pipes utilizing the surplus capacity of the extrusion plant. Besides fuel, Mr Sethna said, the NFC had been set up for the manufacture of ziracaloy reactor structural components like calandria tubes, collant tubes and guide tubes. He said that the collant tubes required for the Madras reactor had been produced at the NFC using newly-procured equipment. Mr Sethna said that India had "long years of satisfactory performance," of nuclear fuel in the reactors at Tarapur and Rajasthan, which were extremely good by any standards. It had been possible to demonstrate in the NFC plant that nuclear fuel for the reactors at Tarapur, Rajasthan and Madras could be produced. [Text] [Calcutta THE STATESMAN in English 13 Oct 81 p 6]

KASHMIR ZIRCONIUM DISCOVERY--Srinagar, Oct 18 (UNI)--An exotic metal discovered by Kashmir University scientists in the waters of the Dal Lake could reverse the threat of pollution, a scientist has said. Professor Jagdish Shankar, Director of the University's Centre of Research for Development told newsmen here that the metal zirconium, had the property of neutralising phosphates and acted as an anti-pollutant. The metal, which has applications in nuclear reactors, was present in all lakes in the valley, Prof Shankar said, adding that it was carried into the lakes by streams flowing down from the nearby mountains. [New Delhi PATRIOT in English 19 Oct 81 p 4]

CSO: 5100/7013

IAEA CHIEF DENIES STATEMENT ON NUCLEAR SAFETY

Karachi BUSINESS RECORDER in English 3 Nov 81 p 1

[Text] Islamabad, Nov 2: The Director-General of the International Atomic Energy Agency has contradicted reports alleging that he had said "he could no longer vouch for the integrity of the IAEA's nuclear safe-guards" in Pakistan.

"Just as comments based on this false report were unwarranted, the statement about Pakistan trying to develop" the missing link" for nuclear weapons was of the 30-month old propaganda campaign designed to mislead public opinion regarding Pakistan's nuclear programme."

The Karachi plant has been inspected over 40 times by the International Atomic Energy Agency. About a year ago the agency also conducted a complete check of the inventory of fuel bundles. After each inspection the Government of Pakistan received communications expressing satisfaction. Never has any allegation been made of non-compliance by Pakistan with the safeguards agreements it signed with the IAEA.

In a telegram to Washington POST, the IAEA said on October 15 that the Director-General at a meeting of the board of governors on 17th September "referred in general terms to difficulties the IAEA has countered in safeguarding on-load refuelled power reactors" and that "he made no reference to any particular country."

CSO: 5100/504

BRIEFS

URANIUM EXPLORATION AID--The International Atomic Energy Agency has sent two experts to train Thai technicians in the exploration of uranium. The training, which started on 29 October, is attended by 52 officials from the Department of Mineral Resources, the Electricity-Generating Authority of Thailand, the Office of Atomic Energy for Peace and the University of Khon Kaen. It is expected that the training will be of major help in uranium exploration activities in northeastern Thailand. [Bangkok Voice of Free Asia in English 1100 GMT 6 Nov 81 BK]

CSO: 5100/2034

ARGENTINA

CASTRO MADERO DISCUSSES NUCLEAR PLAN, TLATELOLCO TREATY

Buenos Aires ESTRATEGIA in Spanish No 69 pp 55-61

[Interview with Vice Adm Carlos Castro Madero, by Luis Sartori, on 3 June 1981; place not specified]

[Text] Reporter: Now that over 2 years have elapsed since the official decree which established the Argentine nuclear plan until the end of the century, what is your opinion regarding the progress in the various areas?

Castro Madero: I am quite satisfied with the implementation of the plan approved by Decree 302/79. This assessment is based on the successful negotiation of the contracts required for the construction of Atucha II and the first industrial heavy water plant. In the former, we assumed responsibility for directing the project, and thus we shall give an impetus to the national capacity for designing, installing and assembling nuclear powerplants, and putting them into operation. For this purpose we have set up a mixed engineering enterprise, ENACE [Argentine Nuclear Enterprise for Electric Powerplants], 75 percent of which is owned by CNEA [National Atomic Energy Commission], which will act as the industrial architect of Atucha II and the next nuclear powerplants. The second is a significant gain, because we conquered the resistance against a developing country's having the capacity to produce heavy water, the latter being considered a sensitive area by the London Club, which is an entity including the countries which supply nuclear technology. The construction of both projects has begun, and they are expected to go into operation in 1988 and 1984, respectively. These contracts have been signed without conditions interfering with our sovereignty or limiting our freedom of action. Moreover, mass production of fuel elements has started, a uranium dioxide production plant is being built in Cordoba and there has been total integration of the processes for the production of zircaloy tubes.

Reporter: A recent report disclosed that CNEA is one of the public enterprises with the greatest foreign debt. How is this situation affecting the normal progress of the work? Were the terms of payment used as a means of pressure by the foreign lending entities? If not, is the problem discernible?

C.M.: In principle, a distinction must be made between the long term and short term foreign debt. The former represents a logical, proper and reasonable expedient for financing the projects in the nuclear plan, the most prominent features of which from this standpoint are the large amount of investment and the long construction period. Hence, this situation facilitates and does not impose conditions on the progress of the work. As for the short-term debt, the amount of it is the result of compliance with the financing structure of the CNEA budget established by the Budget Law. Thus far, with the exception of the increase in administrative work involved in handling that debt, it has not in any way imposed conditions on the progress of the work. The foreign lending entities have not used the terms of payment as an element for pressure. On the contrary, CNEA is of the opinion that, as a result of having managed to establish a competing market in the latest bidding on nuclear powerplants, it was able to demand and procure exceptional terms for the financing of Atucha II (23 years), including a grace period equal to the estimated construction time. Regarding the making of a hypothesis for the future, a diversification is to be expected from international banks, directing their loans toward the expansion of energy sources other than the fossil ones or oil. The overall change in the energy field will increase the demand for funds from the international financing system, and the nuclear sector will participate with a growing percentage in that demand. Those banks, in turn, will have to gear their requirements to the aforementioned features (volume and period) of the nuclear industry. Of course, the features of the international political area will in the end determine the groundrules that will be applied to the nuclear sector and to our country in particular.

Reporter: To what extent do the well-known obstacles imposed by the London Club and, specifically, by the administration of former President Carter, continue to exist, and what are the activities most hurt?

C.M.: The pressure for the country to sign the non-proliferation treaty or to subject its entire nuclear program to safeguards persists, and I don't think that it will decline. We have yet to reach an agreement with IAEA regarding the safeguards that will be applied to Atucha II and the heavy water plant. During the negotiations on those agreements an attempt is being made to include clauses that will entail the application of total safeguards through this indirect expedient. Furthermore, Argentina is encountering increased difficulties in procuring equipment for its programs, and must substitute for this with its own manufactures,of course, at a higher cost and with additional delay. These obstacles confirm to us the need to achieve as soon as possible the greatest degree of autonomy in the mastery of the fuel cycle, so as to avoid being denied, for the sake of non-proliferation, the opportunity to carry out the energy development which the country requires.

Reporter: Do the obstacles posed by Canada, which caused the lag in the construction of the nuclear powerplant at Embalse still persist? Is the termination of that project by the end of 1982 confirmed?

C.M.: The difficulties which arose during the course of this project have been resolved with the passage of time. As in any project of this scope, during its implementation difficulties have arisen which are being surmounted as they occur. Based on the current progress of the project, we estimate that the timetable will be fulfilled as planned, which consists of making the powerplant critical in August 1982, synchronizing the system in September and putting it into full power in November of that year.

Reporter: In connection with the two previous questions, what prospects do you observe after the first visits of envoys from the Reagan government?

C.M.: These first contacts appear to indicate that the Reagan government wishes to improve relations with Argentina in nuclear areas, and to make the United States' nuclear policy as a whole more reasonable, but nevertheless maintaining the basic objective of preventing proliferation. Therefore, a reduction in the non-essential restrictive action for that objective is to be anticipated, such as the "doctrinaire" opposition to all independent action in the nuclear fuel cycle, and the obstacles to exporting components and materials related only peripherally to that cycle. However, it should be recalled that many aspects of the implementation of a change in the United States' nuclear policy will require legislative changes, which entail a considerable time scale. Moreover, when the nuclear policy becomes more reasonable, there will probably be a reduction in the differences between the United States and other countries exporting nuclear technology, which could intensify the approach of potential obstacles to free exchange in this area.

Reporter: It has been learned that those contacts proved the fact that the country to the North will not change its policy in the matter. If this is the case, what is the main difficulty at present, and what position will Argentina assume?

C.M.: Argentina is waiting to see the announced change of policy by the United States in its nuclear relations with Argentina in concrete actions. Nevertheless, because of what has been noted previously, it is likely that the restrictions will continue on the transfer of technology in major areas of the nuclear fuel cycle. Hence, the difficulties cited in response to a previous question, relating to delays, and extra costs and efforts in the implementation of our nuclear program must continue to be taken into account in planning the activities, so as to attain the largest degree of self-sufficiency in the nuclear fuel cycle. In addition to these technological efforts of our own, we must continue to diversify the providers of supplies and technology, and to maintain in all forums a steadfast position in favor of measures that will restore confidence in international nuclear commerce.

Reporter: In June 1980, you stated that the country was preparing to ratify the Treaty of Tlatelolco. What conditions prevailed at that time?

C.M.: My remarks may possibly have been misinterpreted. I have never made such a conclusive assertion, because that decision comes under the jurisdiction of the Ministry of Foreign Relations. What I did say is that the country had begun the process which it deemed unavoidable to carry out, prior to analyzing the feasibility of ratifying the aforementioned treaty. The course of action that was selected consists of prior negotiations with the International Atomic Energy Agency concerning the agreement on safeguards for all its nuclear facilities and activities which is required by Article 13 of the aforementioned international instrument. This step (which the other Latin American countries that signed it took "a posteriori" [after] its ratification) has been deemed unavoidable as a way of insuring that this agreement on safeguards (which, if the Treaty were ratified previously, was to be started and completed in established intervals) does not become a significant obstacle or hindrance to Argentine nuclear technological development for peaceful purposes as a result of the pressure brought to bear on the International Agency by the countries that are supposedly champions of "non-proliferation".

Reporter: What are the reasons for the delay? Could they be associated with local claims to the effect that the Soviet Union and the United States, upon becoming parties to it, will change the essence of the document? Could our country ratify it dispensing with Article 28 thereof?

C.M.: The aforementioned process has continued to date, and has never been interrupted. However, I cannot conceal the fact that major difficulties have cropped up therein. They are due precisely to the pressure imposed on the International Agency that I mentioned before, which has brought about interpretations of the Treaty's clauses that are unacceptable from the Argentine standpoint, because accepting them would interfere with freedom of action in our nuclear development. This holds true for nuclear explosives for peaceful purposes. The United States' adherence to Protocols I and II (although that relating to the former has not yet been ratified), and the USSR's adherence to Protocol II, have facilitated the full force of the Treaty and, consequently, have contributed in theory to making it more acceptable to everyone, including us. However, the interpretative statements made by those countries upon undertaking their respective adherence, which result in the establishment of additional restrictions on the nuclear development of the Latin American nations for peaceful purposes, have contributed to the pressure on the International Atomic Energy Agency with regard to its own interpretation of the clauses of the Treaty of Tlatelolco, in our case creating the difficulties in the negotiations that I mentioned earlier. As I pointed out in my previous response, the ratification of the Treaty of Tlatelolco is contingent on the attainment of a suitable agreement on safeguards with IAEA, and the matter of dispensing with Article 28 is by no means definitive.

Reporter: With regard to the matter of nuclear safeguards, which areas and which types of technology will Argentina not put under that system; in other words, which are the non-negotiable aspects?

C.M.: Argentina maintains that the international exchange of nuclear technology must be covered by suitable safeguards, as a means of promoting the development of nuclear energy for peaceful purposes. On this basis, it has put under safeguards all the nuclear facilities that it has received from abroad, but it refuses to subject to safeguards those facilities which have been developed and built with its own technology, and wherein it has not received any assistance from abroad. This is the only way of actually giving an incentive to external assistance in areas that have been unilaterally defined as sensitive by the London Club. It refuses to give a blank check, such as the signing of total safeguards, which would leave the country without the capacity to negotiate for the procurement of major nuclear technology. In short, safeguards are accepted in exchange for technology.

Reporter: In this regard, has the question about Atucha II been decided?

C.M.: The safeguard requirements relating to the group of contracts which CNEA signed with the firm Kraftwerk Union in connection with Atucha II have been agreed upon completely between the governments of the Argentine Republic and the Federal Republic of Germany, by means of a mutual exchange of letters, after which the Germany Government (keeping its commitment) issued the respective export permit. As I said before, at the present time Argentina is negotiating the safeguards agreement with the International Atomic Energy Agency, during the discussion of which there has been evidence of pressure from third countries to have the nation indirectly accept terms including its entire future program. I am still optimistic that the aforementioned agreement with IAEA can be signed within a few months.

Reporter: The obstacles that have been noted prompted the CNEA to purchase heavy water from the Soviet Union, and to negotiate for the purchase of enriched uranium of that origin; an action which is considered in some circles as a retort to the pressure received from the United States. Even if the relations with Washington were to improve, would the purchases from the Eurasian nation continue? Why?

C.M.: For obvious security reasons, our country must diversify its markets supplying strategic technology and materials, so as not to be subjected to dependent subservience in relation to any given country. This is the reason which prompted Argentina to make the aforementioned purchases from the USSR, and the cause that warrants the continuance of such purchases in the future, regardless of how good or bad relations may be with Washington. Argentine is firmly decided to cooperate with any country of the world that wishes to do so with mutual respect and reciprocal benefit, and to resort to any supplier that proves satisfactory in order to insure the attainment of the objectives of its nuclear program.

Reporter: What real likelihood is there that this supply of materials could be contributed by any other nation of the Nuclear Club, or even one with advanced development in technology which is not a member of that exclusive circle, such as Norway?

C.M.: Among the very members of the Nuclear Club, or the London Club as it is usually termed, we have found some who (without violating their commitments to it) have been able to supply us with materials and nuclear technology without supplementary requirements. This holds true for the Federal Republic of Germany, the Swiss Confederation and the USSR itself. Norway does not have heavy water production plants, nor plants to produce enriched uranium.

Reporter: On what level is this type of contact being made, if there are any?

C.M.: These contacts have been on political, technical and commercial levels.

Reporter: On this point, in your opinion will France's atomic policy change now that the Socialist, Mitterrand, has assumed the government? Could the potential changes have an effect on the London Club or on IAEA?

C.M.: At this stage of events, it is still very difficult to predict the effects that the takeover by Mitterrand's Socialist government in France may have on highly diversified areas, including the nuclear one. One can only predict some slowdown in the highly ambitious French nuclear program. One cannot foresee the potential changes having an effect on the International Atomic Energy Agency or on the London Club. In any event, one can assume an even greater adherence by that country, within these agencies, to the principles of the so-called "non-proliferation policy" which, in the long run, would be reflected in obstacles to the transfer of technology and to the trading of nuclear materials; in brief, significant restrictions on nuclear development for the developing countries, as a means of maintaining the nuclear technology monopoly of the developed countries.

Argentine Nuclear Situation

Reporter: What is the actual scope of the agreement on nuclear cooperation signed with Brazil last year? What areas does it include? Is is already in progress?

C.M.: The cooperation with the Federative Republic of Brazil in the nuclear field has been set up through a general agreement on the part of both governments, and a convention for implementation with the National Nuclear Energy Commission of that country, as well as a convention for implementation and a protocol for industrial cooperation with Brazilian Nuclear Corporations (NUCLEBRAS). These conventions and protocols, in turn, have provided a legal framework for the signing (to date) of two protocols with the former (one in the field of nuclear technical information, and another in that of the training of human resources), and three contracts (one an indirect contract through the German firm Kraftwerk Union AG) with the latter. These contracts relate to the loan on the part of this Commission to NUCLEBRAS of 240 tons of uranium concentrate; the supply (also by this Commission) to the Brazilian company of zircaloy tubes for the manufacture of fuel elements for the future Brazilian nuclear powerplants; and the participation of KWU [Kraftwerk Union] and NUCLEBRAS (through its subsidiary, NUCLEP [NUCLEBRAS Heavy Equipment, Inc]) in the manufacture of the lower part of the pressure tank for the Atucha II Nuclear Powerplant. As may be observed, the scope of the cooperation with Brazil is very extensive, and it is fully under way.

Reporter: In this regard, a few days ago President Figueiredo claimed that his country does not need nuclear technological backing from ours. What do you think of that judgment?

C.M.: I am not familiar with the details of the remarks ascribed to President Figueiredo, nor with the context in which the question that evoked them was asked. For this reason, I refrain from expressing an opinion about them.

Reporter: At the nuclear meeting of the nonaligned countries held during 1980 in Buenos Aires, your speech disclosed the intention of putting Argentina in the forefront of the action in the atomic field. That would afford opportunities for transferring certain technology to non-American countries (as is now being done to Peru, for example). Could this tactic of openness create any friction with Brazil, owing to its hemispheric weight?

C.M.: The developing world constitutes a very broad stage wherein the needs for technical assistance and the possibilities for international cooperation are virtually endless, and obviously far in excess of the capacities of Brazil and Argentina, even combined. Moreover, the relations between the two countries in this area have been marked by mutual respect and sincere cooperation. Hence, one cannot see how the transfer of certain nuclear technology on the part of Argentina to non-American developing countries could create any friction with Brazil.

2909
CSO: 5100/2033

ARGENTINA

NEW NUCLEAR WASTE STORAGE FACILITIES OPERATING

PY102052 Buenos Aires TELAM in Spanish 1300 GMT 31 Oct 81

[Excerpts] Buenos Aires, 31 Oct (TELAM) -- The National Atomic Energy Commission [CNEA] has increased by 200 percent the spent fuel storage capacity of the Atucha powerplant which will thus be able to continue operating with no obstacles for another 15-year period. For this purpose the plant has adequate facilities for safely storing the irradiated fuel elements.

The CNEA has officially received the building of the second pool house [casa de piletas], which can store 1,000 tons of metal uranium including the shells of 6,900 fuel rods. This storage capacity should be added to the present 440-ton storage facility which is about to be filled up.

The facilities include an operations pool [pileta de maniobras] and a storage room where fuel rods are stored in two layers hanging from stainless steel supports. Loads in the pool house are handled with a traveling crane which can lift 80 tons while irradiated material inside the pools is handled with a gantry crane provided with a carriage and an extendable arm to which gripping devices are attached.

Argentina has no major problems at present regarding the development of its capacity for storing irradiated fuels, but pertinent agencies are already planning security measures similar to those under study in Europe and which will have to be enforced in the year 2,000, when it is certain that substitutes for conventional energy balance does not require the adoption of drastic and complex measures yet, since [words indistinct] electricity has not reached a critical level.

CSO: 5100/2034

BRIEFS

HEAVY WATER PLANT OPERATES ON GAS--Buenos Aires, 4 Nov (TELAM)--It was announced here today that the heavy water plant that the National Atomic Energy Commission [CNEA] is building in Arroyito will operate on gas from the Neuquen basin. The announcement was made on the occasion of the call for bids for the construction of a gas pipeline and a reducer [estacion reductora]. The commission has estimated that the necessary investment will amount to approximately 13.8 billion pesos. This amount will be the base for the bidding that will take place on 3 December 1981 at the commission's headquarters on Libertador Avenue. The fuel gas to be used by the heavy water plant will be conveyed by a 16-km-long gas pipeline made up of 8-inch diameter pipes from the rich Neuquen Province basin whose reserves have been estimated at 314 billion cubic meters. The commission has decided to establish a 7-month building period starting from the date of the signature of the contract. It foresees an approximate daily gas consumption of 800,000 cubic meters. CNEA's decision to make use of the gas at a place that is close to its natural sources has been regarded as an important step aimed at reducing the cost of the Arroyito industrial plant. [PY092356 Buenos Aires TELAM in Spanish 1545 GMT 4 Nov 81]

CSO: 5100/2034

BRAZIL

NUCLEAR ENGINEERING PROFESSOR VIEWS TRAINING, JOB MARKET

Rio de Janeiro O GLOBO in Portuguese 23 Oct 81 Supplement p 1

[Text] Expansion of the job market for nuclear-related occupations depends upon acceleration of the National Nuclear Energy Policy and the timetable of the Brazil-FRG Nuclear Agreement, according to Luiz Fernando Seixas de Oliveira, professor in the Nuclear Engineering program at Rio de Janeiro Federal University [UFRJ].

At present the market is in balance because nearly all technicians trained since 1976 (when the National Nuclear Energy Policy was instituted) have been employed in building the Angra dos Reis power plants. With the stretch-out of the construction timetable, however, the government limited scholarships to what a stagnant labor market could absorb.

"It cannot be said that there is unemployment in the sector. There was a great deal of training during the last 5 years, but that is now limited by the government, which each year grants fewer scholarships to universities with accredited courses in the nuclear area. All these graduates are now employed. But because of the stretched-out timetable young professionals who are still in training may face unemployment."

According to Luiz Fernando, only the government could help expand the labor market for professionals in the nuclear area. In his opinion, this could be done by returning to the timetable originally established in the Brazil-FRG agreement, which in 1976 provided for construction of nine reactors by 1990.

"The government," Luiz Fernando said, "within the initial concept of the agreement had planned that nine nuclear reactors would be operating in Brazil by 1990. This deadline has been extended to 1995 and so far only the Angra I plant is anywhere near operation."

Luiz Fernando thinks the agreement should not have been made in the way that was planned "because Brazil cannot afford even to begin a project of this sort." The delays in construction timetables are, according to him, proof that this warning should have been heeded.

In the professor's opinion, before planning the power plants greater emphasis should have been given to training the personnel needed to put them in operation. According to Luiz Fernando, small nuclear projects should have been carried out in order to "develop genuine domestic competence on a larger scale.

"On that basis the government could then have gone on to larger projects, in keeping with rigorous planning that could forecast not only costs but also manpower utilization," he said.

Other experts in the sector note that if the nuclear program were on schedule it would have to be slowed down due to lack of qualified personnel in Brazil. Luiz Fernando says the only reason Brazil is not feeling the effects of this manpower shortage is that the timetable for building the reactors is far behind schedule.

"If the program continues as it is now," he said, "there will be no manpower shortage, even though the trained professionals are already in the market and the number in training is constantly decreasing because of the scholarship limitation. But what Brazil really lacks is very high-level specialists with vast experience in the field to operate the major agencies dealing with nuclear activities. For this purpose we are still importing even technicians."

According to Presidential Decree No 77,977, which instituted the Human Resources Program for the nuclear sector (PRONUCLEAR [Brazilian Nuclear Program]), there were to be 4,335 higher-level and 5,580 intermediate-level professionals, for a total of 9,915, to be trained in the 1976-85 period. Among the higher-level professionals there were to be 3,690 engineers (civil, mechanical, electrical, electronic, metallurgical, chemical and mining), 150 geologists, 300 physicists and 195 graduates in other areas.

According to Joaquim Francisco de Carvalho, director of NUCLEN [Nuclebras Engineering, Inc] (a subsidiary of Nuclebras) from 1966 to 1969 [sic; 1976 to 1979?], "the problem of training manpower for nuclear energy in Brazil will not be solved through building nuclear power plants." The problem, he says, should be viewed in an all-embracing manner, beginning with elementary education.

"After all," he said, "what is a specialist in nuclear energy? Is it the neutron physicist? Or is it the metallurgist, the mechanical engineer or the instrumentation and control specialist? All of these and even a chemist could be converted into excellent nuclear engineers, provided that they have had good academic training and experience acquired through professional work in industry."

This last aspect is what is lacking, according to Joaquim de Carvalho, who cites "a chronic deficiency"--in qualitative and quantitative terms--in intermediate vocational training and a "great qualitative deficiency in training higher-level engineers in the areas of mechanics, metallurgy, chemistry and instrumentation and control." These should be the courses taken by engineers who want to enter the nuclear field, according to Joaquim Carvalho.

"Good engineers trained in these specialties can work in a variety of fields in industry and in the energy sector, such as production and utilization of biomass fuels or thermoelectric generation from coal or hydroelectric generation."

The former NUCLEN director believes that, working in these sectors "closely associated with Brazil's natural-resource endowment," such professionals could "reimburse to society in a short time what was invested in their professional training.

"Later, then, when it really became necessary," he said, "mechanical, metallurgical, electrical, instrumentation and control and even chemical engineers could be trained for the nuclear field with a small additional investment."

This, he says, is how it was done in rich countries such as Germany, France and the United States. He said he could not see why a country as poor as Brazil should invest money beyond its means to train nuclear engineers on a large scale when, as a matter of fact, we do not yet need such engineers, since we can generate in hydroelectric plants all the electricity we need until at least the second decade of the next century.

In the opinion of Joaquim Carvalho, a nuclear engineer is nothing more than a mechanical or metallurgical or chemical or electronic instrumentation and control engineer who has acquired precise understanding of industrial problems and who has practical experience in quality assurance and control programs.

Moreover, he emphasized that Brazil must train these same professionals to develop techniques for producing and utilizing biomass fuels (generation of coal in conventional standards). He explains why:

"I should like to recall that if we were to use only 2 percent of the national territory for decentralized biomass production in 'agro-energy' districts distributed throughout the federation, we could have in such districts a combined production of fuel (alcohol, charcoal, biogas, and so forth) with an energy potential equivalent to about one-third of Saudi Arabia's petroleum production. This would probably go a long way toward making Brazil a rich country and with good income distribution, because biomass is, by definition, labor intensive."

Joaquim Carvalho also spoke about the activities of the chemist, physicist and geologist in the field of nuclear energy. The chemist works directly in control of radioactive material and in production of nuclear fuel, from processing the ore to conversion, enrichment and reprocessing.

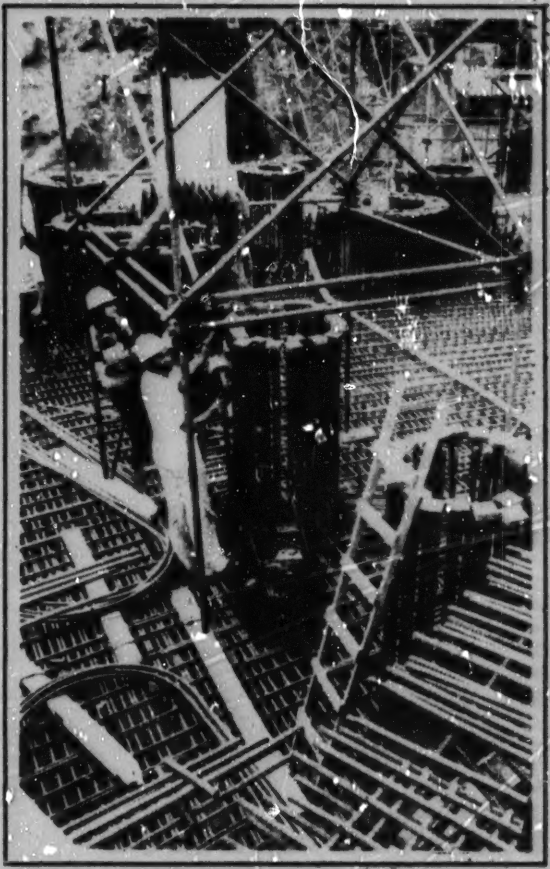
The physicist is devoted more to research and conducting studies related to computations for nuclear reactors, nuclear fuel and control of radiation. The geologist works in exploring and processing nuclear material.

The major employer is, essentially, the government, through Nuclebras and its subsidiaries. In Rio de Janeiro, other employers are the Nuclear Engineering Institute, of the National Nuclear Energy Commission; Furnas Electric Power Corporation; Radio-Production [sic; Radio-Protection?] and Dosimetry Institute; and the universities. All offer a nuclear engineer a starting salary of about 140,000 cruzeiros.

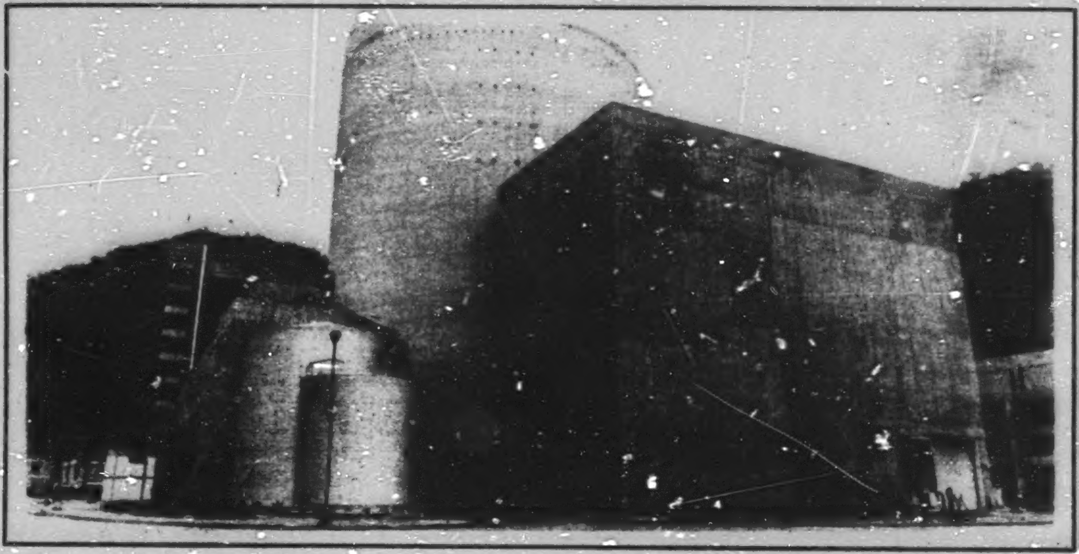
In Brazil there are not yet any undergraduate courses in the nuclear area. At this level in Brazil there are "nuclear option" courses, offered by about 15 institutions located in various parts of the country. The nuclear option is an offering, during the last 2 years of engineering study, of some elective courses such as nuclear physics, atomic physics, nuclear engineering and radio-protection.

The nuclear option is offered in Brazil at the federal universities of Santa Maria, Rio Grande do Sul [UFRS], Santa Catarina [UFSC], Parana, Sao Carlos, Rio de Janeiro,

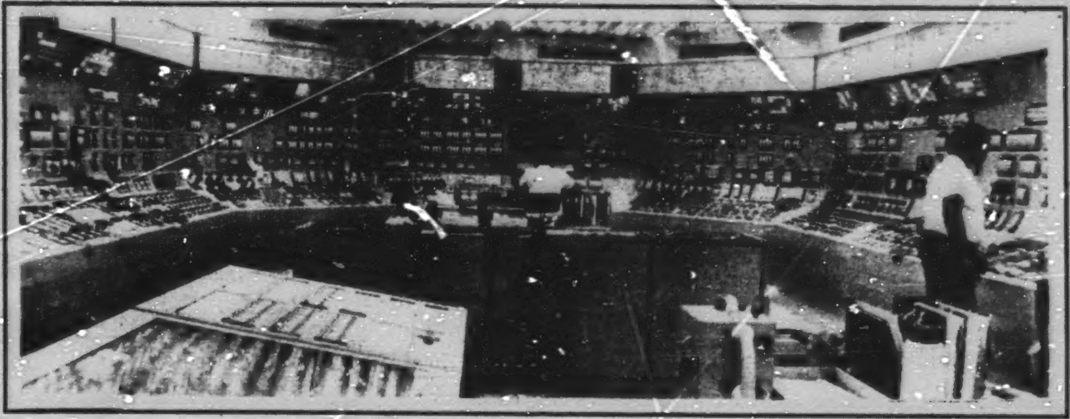
Authorities and Minister Cesar Cals
in the center of the Angra I reactor



Workers prepare the concrete base
for the Angra II reactor



The Angra I nuclear reactor is in the biggest building, where it is in the testing stage



The room where the whole process of generating energy at Angra I is controlled

Pernambuco and Paraiba [UFPB]; the universities of Sao Paulo [USP] and Brasilia [UNB]; the Technical Aeronautics Institute [ITA]; the Atomic Energy Institute; the Military Engineering Institute [IME]; the Pontifical Catholic University of Rio de Janeiro [PUC/RJ]; and the Itajuba Federal School of Engineering.

At the graduate level, master's-degree programs in the nuclear area are given in the Atomic Energy Institute, the Coordination of Postgraduate Programs in Engineering (COPPE) of the UFRJ, the Military Engineering Institute and the federal universities of Minas Gerais and Pernambuco.

At the master's-degree level there is also the "nuclear cap," which consists of some institutions offering some specific courses, within the normal graduate course in engineering.

There are "nuclear cap" graduate courses within civil engineering (offered by COPPE, PUC/RJ and UFRS); mechanical engineering (PUC/RJ, ITA and UFSC); electrical engineering (UFSC, USP, UFPB and ITA); chemical engineering (COPPE); metallurgy and materials (COPPE, IME, UFRS and USP); "micrometereologia" [micrometeorology?] (National Space Research Institute); and geology (UNB and UFPA [Federal University of Para]).

8834
CSO: 5100/2032

NUCLEBRAS DETAILS PARTICULARS OF CEARA NUCLEAR COMPLEX

Rio de Janeiro JORNAL DO BRASIL in Portuguese 2 Nov 81 p 12

[Text] Brasilia--Nuclebras, with the staff of Mines and Energy Minister Cesar Cals, is working out details of the integrated nuclear complex the minister wants to construct in Ceara, sources associated with his office revealed.

Wednesday Ambassador Paulo Nogueira Batista, Nuclebras president, met with the mines and energy minister to work out details of the complex. At the same time the company's superintendent, Col Sebastiao Valadao, was meeting with the minister's staff to get the project started in the right direction.

Plants

According to the ministerial source, the idea is to construct a nuclear complex whose feasibility is closely related to developing the phosphate associated with the uranium ore. PETROFERTIL [Petrobras Fertilizers, Inc] will be responsible for processing the phosphate rock, the raw material for phosphate fertilizers.

The complex, according to plans being studied, will be composed of the following stages: a) mining; b) separation of the phosphate; c) concentration of the uranium (production of yellow cake); d) conversion of uranium oxide into uranium hexafluoride; e) enrichment; f) reconversion of enriched uranium hexafluoride into uranium oxide, the form in which it will be exported.

The mines and energy minister's staff source also said the matter of providing electric power for the complex is being worked out with ELETROBRAS [Brazilian Electric Power Companies, Inc]. Three alternatives are being studied: construction of a 1,300-megawatt nuclear unit; construction of two 650-megawatt units; or even, should demand warrant, two 1,300-megawatt units.

The Mines and Energy Ministry and Nuclebras hope that everything will be planned so that Brazil can have enriched uranium available for export as of 1990 or 1991, as a big demand for the product in the international market is expected from that time on.

For furnishing electric power, an extensive study is being made that includes construction of hydroelectric plants on the Sao Francisco River and in the Araguaia-Tocantins Basin.

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CSO: 5100/2032

NUCLEN, CSN READY CIVIL DEFENSE PLAN FOR ANGRA DOS REIS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 11 Nov 81 p 15

[Text] Brasilia--In case of accident at the Angra dos Reis nuclear power plants, the government has nearly completed and is keeping under strict secrecy a plan for defense of the endangered population that is being coordinated by NUCLEN [Nuclebras Engineering, Inc] and the National Security Council. The Special Secretariat for Civil Defense (SEDEC) of the Interior Ministry, the three military ministries and the Rio de Janeiro Civil Police and Fire Department are also participating.

The fact that the plan is now in its final stage was confirmed yesterday in Brasilia by Gen Anibal Gurgel do Amaral, moments before the opening ceremony of the Second National Civil Defense Symposium.

In his speech he announced that his ministry is concluding studies relative to creating the National Civil Defense System which, among other responsibilities, is to "provide the general public with suitable information about undertakings in the nuclear field."

However, some technicians who are helping plan the Angra dos Reis project--organization of a civil defense strategy is one of the requirements for licensing the plant--do not understand how the operational plan can be kept secret, as it will, in extreme cases, be used to mobilize the stricken population. In reference to the civil defense plan, General Anibal said--without explaining whether or not it was being done--that "a campaign will be conducted to inform the public about how nuclear plants operate." According to the general, "the public need not worry, because the probability of a serious accident is 1 in 100 million," adding that "even though it is practically impossible, we have prepared a civil defense plan." Anibal also believes that the refineries in the city are more dangerous to the population of Rio de Janeiro than are the Angra dos Reis power plants.

Another agency of the Interior Ministry that studied the subject and prepared a plan in addition to the one by SEDEC is the Special Secretariat for the Environment, which made a study about permanent evaluation of radioactive contamination in the Angra dos Reis area at a distance of more than 15 kilometers from the power plant. Monitoring radiation within that 15-kilometer radius is the exclusive responsibility of CNEN [National Nuclear Energy Commission].

The national civil defense system is intended mainly to strengthen the sector through a better organization of SEDEC, which operates a fund--the National Public Calamity Fund--that this year had an appropriation of only 90 million cruzeiros. This would not be enough money for SEDEC to meet its responsibilities planned by the system to be established, such as effectively coordinating the preventive, care and recovery measures necessary in an emergency situation, as well as establishing standards for transporting dangerous products and controlling the flow of such material.

8834
CSO: 5100/2032

BRIEFS

ENRICHED URANIUM CONTRACT CONFIRMED--The South African Electricity Supply Commission has confirmed that a contract has been concluded for the supply of enriched uranium for the nuclear power station at Koeberg near Cape Town. A spokesman confirmed a report that the French consortium Framatome, the main contractor at Koeberg, would be obtaining the uranium, although the exact source of the material was not revealed. Earlier this year there were reports that the Koeberg project was being jeopardized by American refusal to supply enriched uranium to South Africa unless this country became a party to the nuclear nonproliferation treaty. The new development means that the Koeberg station is proceeding according to plan and should be on stream by the end of 1982. [Text] [LD131726 Johannesburg International Service in English 1500 GMT 13 Nov 81]

CSO: 5100/2034

UK TO JOIN FIVE OTHER COUNTRIES IN URANIUM PROSPECTING

Lusaka DAILY MAIL in English 5 Nov 81 pp 1, 4

[Excerpt] Britain has become the latest state to join other countries which have shown interest in prospecting for uranium in Zambia.

Permanent Secretary for Mines Mr Julian Masaninga said in Lusaka yesterday that the Ministry had been approached by Britain with interest to start prospecting for the strategic mineral.

Britain's desire to explore for uranium in Zambia is in addition to Power Research and Nuclear Fuel Development Company of Japan and, Romania, which have also shown interest.

Three companies, Saarberg Interplan of West Germany and Agip SPA of Italy in confunction with Cogema of France are already prospecting for uranium in various parts of the country where a lot of potential of the mineral had been discovered.

Uranium is a strategic mineral used in the production of atomic energy and is also used in the production of atomic bombs.

Mr Masaninga said negotiations between the government and Britain would start paving the way for an agreement "as soon as they are ready."

That there were so many countries showing so much interest in prospecting for the mineral was an indication of the potential for the minerals' presence in the country, he said.

Mr Masaninga said mining of the uranium could not start at the moment because of the amount of groundwork to be done, by the companies prospecting for the mineral before going into full scale mining.

During the recent visit to Europe with Minister of Mines, Mr Mufaya Mumbuna, many rounds of talks were held with some of the companies based in the countries visited and involved in prospecting for uranium in Zambia, he said.

"While in West Germany, we had discussions with Saarberg Interplan to find out what problems they are facing and how we can assist them," Mr Masaninga said.

He said all the companies so far had only prospecting licences before embarking on mining of the mineral.

Mr Masaninga said he has had talks with Saarberg Interplan on the need for the company to expand their administrative offices here and embark on the training of local personnel in the field of uranium prospecting.

He said, the company had responded favourably in this direction and hoped that an agreement would soon be signed.

CSO: 5100/5606

PAPER FINDS COUNTRY LAGS BEHIND SWEDEN IN NUCLEAR WASTE DISPOSAL

Helsinki HELSINGIN SANOMAT in Finnish 18 Oct 81 p 2

[Editorial: "Must Prepare Now for Nuclear Waste"]

[Text] Finland is at present one of the leading countries in the use of nuclear power. As nuclear power has also been able to maintain its competitiveness with other forms of energy, our country has done well from the economic point of view.

We are faced with one worry, however: Finland is not among the leading countries in the study of problems related to the use of nuclear power. For example, we lag far behind Sweden. Sweden's proportion of nuclear power use is equal to ours, but Sweden uses noticeably more money for the study of nuclear waste management and disposal than the Finnish power industry does.

Although it can be said that Sweden should bear greater moral responsibility of waste disposal research since it constructs nuclear power plants, the Finns do not have the right to stay behind and expect others to come up with ready answers to these problems. As long as nuclear waste is being produced in Finland, the responsibility for nuclear pollution belongs to Finns as well, not only to the suppliers of nuclear power plants.

The committee on nuclear energy law postulates that the producers of nuclear waste must be responsible for disposal as well as for the expense involved. With this principle in mind, the committee proposes that nuclear power companies must prepare themselves for nuclear waste disposal already now by stowing away funds for this purpose.

The committee estimates that the nuclear power companies should have about Fmk 3 billion savings by the time the first reactors have burned out. The yearly expense for the companies would be quite steep, but at the moment it is the only preparatory measure possible.

Insufficient attention has been paid so far to the closing of the nuclear plants. The radioactive content of the unloading waste is as high as that of the so-called nuclear power plant waste, which stays dangerous for hundreds of years. The demands of this task are manifested clearly by for example the fact that the discarded pressure chamber of a nuclear reactor takes 1500 years to become harmless. We will have the first one of these in our hands as early as after 30 years. For this reason, we must not linger in starting to collect funds for this purpose.

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END

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 125

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 125

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BRIEFS

NUCLEAR REACTOR PROGRESS--The country's first nuclear research reactor which is the heart of Bangladesh Atomic Energy Commission (BAEC) Savar Complex will be critical well ahead of schedule time, says a Press release This was stated to the newsmen by Dr. R.A. Ghani, Minister of State for Science and Technology on Wednesday morning while visiting the under-construction reactor building at Savar, 25 miles away from Dacca city. The 3-Megawatt Triga Mark-II research reactor of USA origin which can play a vital role on the country's economy will be placed in it. The Minister informed that the reactor will produce radoi-isotope required for agriculture industry, and nuclear medicine including manpower training in reactor technology, nuclear Chemistry, solid state physics, electronics, nuclear engineering and nuclear power programme Later the Minister visited the Building Research Institute at Mirpur. He stressed the need for low cost building and asked the concerned engineers to erect low cost building at different parts of the country to popularise their research findings. [Text] [Dacca THE BANGLADESH OBSERVER in English 22 Oct 81 p 1]

CSO: 5100/7020

UN DELEGATE SPEAKS ON NUCLEAR CONFRONTATION

New Delhi PATRIOT in English 24 Oct 81 p 3

[Text] United Nations, Oct 23 (UNI)

India has charged the super powers with pushing mankind, 'closer to a nuclear catastrophe than ever before.'

Addressing the United Nations Political and Security Committee yesterday, Indian delegate S.M. Krishna, MP, said 'We are today closer to a nuclear catastrophe than at any other time since the dawn of the atomic age.'

'This' the Indian representative said, was 'the result of the policies of confrontation followed by the major powers and the relentless build-up of armaments that they have been engaged in.

'The relations between the two major nuclear powers and the alliance systems headed by them have taken a turn for the worse during the recent months and the language of the cold war of the fifties is being heard again with a new stridency,' he said.

Mr Krishna said the greatest threat to human survival today stemmed from the danger of the outbreak of a nuclear war and that was why the General Assembly's first special session on disarmament had given the highest priority to elimination of atomic weapons.

'Despite this clear cut commitment of the international community,' Mr Krishna said, 'attempts are still being made to shift the focus of disarmament efforts to issues such as conventional disarmament.'

While India is not opposed to conventional disarmament, it believes that efforts in this direction must be conceived in the overall context of achieving general and complete disarmament, he added.

Mr Krishna listed the priorities as: Reduction in nuclear weapons, other weapons of mass destruction, including chemical weapons, conventional weapons and conventional armed forces.

He said since the very nuclear weapon powers were also the bulk producers and suppliers of conventional armaments, any measure of conventional disarmament must first and foremost be the responsibility of these states.

He said developing countries could not be denied the means to defend their political independence--in many cases only recently won--while a handful of states accumulated vast arsenals of nuclear and conventional weapons.

He said creation of nuclear weapon-free zones also would make sense only if accompanied by measures of nuclear disarmament. 'If a nuclear war breaks out nuclear weapons-free zones will not escape from its cataclysmic effects.'

Mr Krishna said, 'at a time when detente was a more respectable word, India had pointed out that, to be enduring, detente must extend to all parts of the globe.

Mr Krishna said a general and complete disarmament besides eliminating the danger of war and the use of force in international relations, would also release real resources for economic and social development of the depressed countries of the South.

Ordinary people the world over have been coming out in thousands to protest against the arms race, he said. 'It would be a mistake to interpret these sustained and spontaneous waves of popular dissent as pacificism or unrealistic idealism. They are in fact an expression of man's basic instincts for survival.'

CSO: 5100/7014

REDDY OPENS NUCLEAR DISARMAMENT FORUM

Calcutta THE SUNDAY STATESMAN in English 25 Oct 81 pp 1, 7

[Text]

RAJGIR, Oct. 24.—The introduction of nuclear weapons into the arsenals of nations has brought about a radical change, and war and peace are now the concern of every nation, according to the President, Mr N. Sanjiva Reddy, report PTI and UNI.

Inaugurating the Venu Vihar and the international forum of nuclear disarmament and prevention of nuclear war here today, Mr Reddy said that formerly war was the concern of only those fighting it while other nations in the world were not affected.

"Today", Mr Reddy said, "war fought with nuclear weapons would mean the bursting of enough bombs and consequent radioactive fall-out to foul the air, water and soil of the whole planet and mankind could be condemned to death and disease, without distinction".

"There exists thousands of nuclear weapons of different kinds and destructive strength in the hands of the nuclear weapon States. On the other hand, we also learn that we have the means of producing unlimited energy anywhere in the world by nuclear reaction which could be used for peaceful and constructive work", he added.

Referring to scientific and technological developments of the last three decades, Mr Reddy said there were three possible ways in which the nuclear space age could affect human civilization.

The first is total destruction of civilization by a full-scale nuclear war, the President said.

The second, he said was the continuation of the present phase of nuclear stalemate, expanding population and limited increase in food production and subsequent perpetuation of hunger, privation and misery" further accentuating the gulf between the rich and poor".

The third was "plentiful generation of energy and food, elimination of disease so that mankind may not only have freedom from want, hunger and illness but plenty of leisure in which to develop the fine arts". Mr Reddy added.

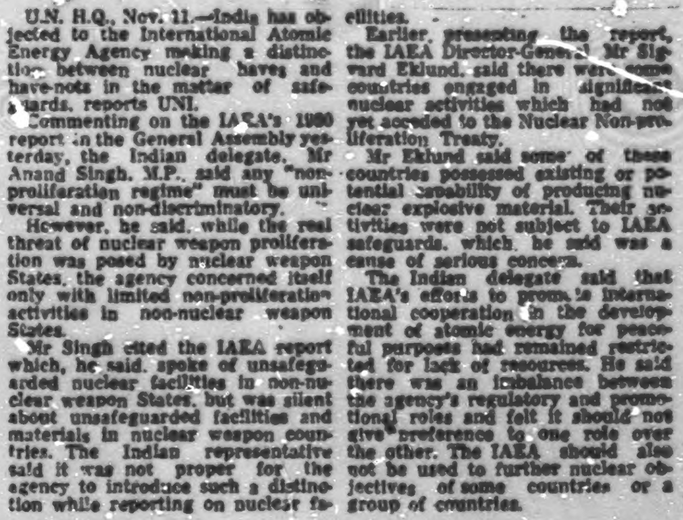
"Before we can hope to change our present state and grasp the utopia depicted in the third possibility we have to devise means by which the first possibility can be averted, the President said adding in the present nuclear age, war was unimaginable as an instrument of policy".

Speaking on the occasion, the Bihar Governor, Mr A. R. Kidwai, said the scientific discoveries of today should be utilized for the good of mankind. Modern science had helped us to utilise space and atomic energy for human prosperity and for the alleviation of human suffering, he added.

INDIA SCORES IAEA REPORT ON NUCLEAR FACILITIES

Calcutta THE STATESMAN in English 12 Nov 81 p 8

[Text]



U.N. H.Q., Nov. 11.—India has objected to the International Atomic Energy Agency making a distinction between nuclear haves and have-nots in the matter of safeguards, reports UNI.

Commenting on the IAEA's 1980 report in the General Assembly yesterday, the Indian delegate, Mr Anand Singh, M.P., said any "non-proliferation regime" must be universal and non-discriminatory.

However, he said, while the real threat of nuclear weapon proliferation was posed by nuclear weapon States, the agency concerned itself only with limited non-proliferation activities in non-nuclear weapon States.

Mr Singh cited the IAEA report which, he said, spoke of unsafeguarded nuclear facilities in non-nuclear weapon States, but was silent about unsafeguarded facilities and materials in nuclear weapon countries. The Indian representative said it was not proper for the agency to introduce such a distinction while reporting on nuclear facilities.

Earlier, presenting the report, the IAEA Director-General Mr Sigward Eklund, said there were some countries engaged in significant nuclear activities which had not yet acceded to the Nuclear Non-proliferation Treaty.

Mr Eklund said some of these countries possessed existing or potential capability of producing nuclear explosive material. Their activities were not subject to IAEA safeguards, which he said was a cause of serious concern.

The Indian delegate said that IAEA's efforts to promote international cooperation in the development of atomic energy for peaceful purposes had remained restricted for lack of resources. He said there was an imbalance between the agency's regulatory and promotional roles and felt it should not give preference to one role over the other. The IAEA should also not be used to further nuclear objectives of some countries or a group of countries.

CSO: 5100/7018

ATOMIC ENERGY DEPARTMENT PLANS, PROGRESS NOTED

Madras THE HINDU in English 12 Nov 81 p 6

[Text] BOMBAY, Nov 11

The Department of Atomic Energy is now working on the design of the large size 500 MW nuclear power units.

This was stated by Dr. Homi N. Sethna, Chairman of the Atomic Energy Commission, at the international scientific forum on changes in energy now in session in Mexico.

He added that in fact many of the components for the Narora station had been designed to permit easy transition to the 500 MW size.

On the fast breeder programme, Dr. Sethna said, that the major components of the fast breeder test reactor (at Kalpakkam in Tamil Nadu) were fabricated in India. The feasibility of 500 MW fast breeder reactors was also being examined.

Dwelling on the present plan for construction of ten more units of 235 MW each of the Narora type station in addition to the nuclear power plants now under operation or construction, Dr. Sethna expressed his confidence in the ability of the Indian industry to tackle the new technologies and hoped that the construction period of these new stations would be reduced progressively.

He was of the opinion that individual developing countries had to undertake detailed studies based on their own experience and conditions and thereafter plan their own programmes best suited to their needs. He offered India's cooperation in sharing its experience with the other developing countries. "We are equally anxious to learn from the experience of other developing countries" he added.

The international forum which started in Mexico on Monday is expected to conclude on Friday.

Commercial production of silicon solar cells

PTI reports from New Delhi:

The silicon solar cells, developed by the Bhabha Atomic Energy Research Centre, are now poised for commercial production, according to the Department of Atomic Energy (DAE).

The knowhow for these solar cells has been transferred to BHEL, which has got a Rs. 3.5 crores order from the Department of Space for supplying one lakh solar cells.

The indigenous solar cells, first tested aboard the Indian satellite, Bhaskara, were later used on a solar panel to meet part of the power requirement of Rohini Satellite 1 which was launched in July last year.

The solar cells which have proved their space-worthiness have even greater potential for large scale power generation to meet energy needs on earth, according to the DAE.

But as they are prohibitively expensive now the DAE is pursuing two approaches to bring down the cost per unit watt, to make cells an economically viable proposition. One is to get higher efficiency possibly at higher cost and the other is to produce less expensive cells possibly at lower efficiency.

The DAE is also considering a proposal to use the advanced solar cells on satellite for solar power stations (SSPS). These stations placed in geostationary orbits would convert solar energy into electricity and transmit it to earth as microwaves by using amplotrons. On ground the microwave energy can be converted and fed into the existing power grids.

The yardstick DAE will use in future, for assessing the large scale conversion of sunlight on ground would be in terms of energy-cost-effectiveness rather than money-cost-effectiveness.

According to this concept, the useful operating life of the photovoltaic system must be long enough so that more energy is made available by it than is needed to make it.

The DAE feels it would be necessary to build and operate a terrestrial solar breeder plant which will manufacture solar cells using solely solar energy.

CSO: 5100/7019

PRESS REPORTS KRISHNA REMARKS ON NUCLEAR PROBLEMS

Fuel Restraints Deplored

Calcutta THE STATESMAN in English 4 Nov 81 p 4

[Text] U.N. H.Q., Nov. 3--India yesterday deplored the imposition of "unilateral restraints" on the export of nuclear fuel, equipment and material supplies to developing countries, reports PTI.

The Indian delegate, Mr S. M. Krishna, M.P., said such actions affected the developing countries' economic progress. It also widened the technological gap between the advanced and the Third World countries.

Mr Krishna rejected in advance the Pakistani proposal for the establishment of nuclear-free zone and regretted the "systematic dilatory tactics" adopted by the Big Powers to block the Indian Ocean this year in Sri Lanka.

On the restraints imposed by the nuclear material supplier States, he said: "... The international community must reject the view that the spread of nuclear technology necessarily and inevitably increases the risk of horizontal proliferation of nuclear weapons"

"The problem of proliferation of nuclear weapons, both in its vertical and horizontal aspects, is essentially a political and not a technical problem, and must be solved through political means. One of the most vital components of such a political solution is the urgent negotiation of concrete measures of nuclear disarmament, for which special responsibility rests with the nuclear weapon States", he said.

"We continue to believe that the proposal to set up a nuclear weapon-free zone in south Asia, does not, in any of its aspects, meet these requirements," he said.

"One should not ignore the fact that nuclear weapons were deployed in the Asia-Pacific region, foreign bases were being maintained and more were being sought in the Indian Ocean. The proposal had been put forward without any prior consultations. For all these reasons, India opposed it", he added.

Nuclear-Free Zone Rejected

New Delhi PATRIOT in English 4 Nov 81 p 3

[Text] United Nations, Nov 3 (UNI)--India has said the proposal to establish a nuclear weapon free zone in South Asia had been made in "flagrant violation" of internationally accepted principles and would not get Indian support.

"Our opposition to the proposal has been consistent and clear cut" said delegate S M Krishna, MP, during the UN political and security committee's annual general debate on disarmament topics yesterday.

The Indian representative gave three reasons for his country's position.

"The creation of such zones makes sense only if they are conceived of as part of a credible programme for the urgent achievement of nuclear disarmament."

"The region to be covered by any such zone must be viable in the sense that it is a well-defined geographical and geopolitical unit."

"The initiative for the creation of such zones must come from the countries of the region concerned and follow a process of mutual consultations among them".

The Indian delegate said, "we continue to believe that the proposal to set up a nuclear weapon free zone in South Asia does not, in any of its aspects, meet these requirements."

Mr Krishna said South Asia was an integral part of the Asia Pacific region and could not be artificially isolated as a self-contained entity.

"Nor should one ignore the fact that nuclear weapons are deployed in the Asia-Pacific region and foreign military bases are maintained, and more are being sought in the Indian Ocean".

Mr Krishna said the proposal had been put forward (by Pakistan without any prior consultations among the countries concerned. "The situation is also complicated by the fact that not all countries belonging to South Asia share common perceptions and security concerns," he said.

He said "should such a proposal be presented to the committee again this year, in defiance of the internationally accepted principles that must be observed in the establishment of nuclear weapon free zones, India will, as in the past, reject it emphatically."

Mr Krishna hoped, 'members of this committee, all of whom have subscribed to these principles without reservation, will not countenance their flagrant violation, which is so patently evident in this proposal."

CSO: 5100/7015

INDIAN APPROACH RELEVANT FOR MANY DEVELOPING COUNTRIES

Kuala Lumpur BUSINESS TIMES in English 21 Oct 81 p 6

[Article by Ho Sook Han]

[Text] "NEUTRONS smell," protests the home-made sign draped from the window of a dreary row of flats on Bombay's Pedder Road.

The anti-nuclear message is unusual in a country which apparently has "no problems with public acceptance of nuclear power," as Dr H.N. Sethna, chairman of India's Atomic Energy Commission, asserts.

Dr Sethna goes so far as to say that the current dispute with the US over the continued supply of enriched uranium for the 400 MW Tarapur power plant, a few miles north of Bombay, will only "strengthen India's determination to be completely self-sufficient in nuclear power production in the long run."

India's plans are certainly ambitious. It presently has two nuclear power stations with a total capacity of 840 MW and two more are under construction. One of them, near Madras, is expected to be commissioned next year.

Targets for the next 20 years involve the installation of some ten more reactors of the type being constructed to be followed by about a dozen larger 500 MW reactors.

Reactors now in operation and under construction account for only about 1,300 MW or only 4.3 per cent of current installed capacity of 30,000 MW.

Even with the expected increase in investment in nuclear power plants, the contribution of nuclear power to total installed capacity will decrease. Coal and hydro are expected to be the major power sources.

Total installed capacity by the year 2000 has been estimated, perhaps unrealistically, to come to about 710,000 MW and of this, 10,000 MW or 1.4 per cent is expected to come from nuclear power plants.

In contrast, Malaysia has shelved its full scale nuclear power programme at least until the next century. The country's sole reactor, the 1 MW Puspati, which is expected to be commissioned this December, is mainly for research purposes.

Malaysia seemed ready to consider seriously a nuclear power programme during the mid-70s but with increased certainty about the availability of other resources such as coal, natural gas, oil and hydro, the energy picture changed substantially.

In addition, nuclear power plants do not come cheap. Prices of uranium — the basic raw material for nuclear energy — have shot up; so has the cost of construction — and Malaysia would have to depend almost entirely on foreign imports of uranium as well as technology.

Environment and safety factors are also involved. Malaysia, however, has not given up on nuclear power altogether. The National Electricity Board retains a nuclear power unit which is expected to keep abreast of the latest developments in the field.

Ms Bebe Chooi, research head of Petronas, says the nuclear option makes sense only for such uranium-rich countries as the US and France and those which have no indigenous energy resources such as South Korea and Japan.

India belongs to the first group of countries. Its uranium deposits, mostly in the state of Bihar, are estimated at 32,000 tonnes.

The Indian government is also anxious about the urgency of meeting energy needs especially in view of the growing scarcity of traditional energy sources such as firewood.

There are regions in the country which are far away from coal, oil, gas or hydro resources. These factors explain why India went ahead with nuclear power stations despite the fact that the initial investment and gestation period are greater than for coal-fired power plants.

In this India is unique as it is the only developing country and one of a select handful, to have the complete nuclear cycle, right from uranium exploration, mining, extraction and conversion through to fuel fabrication, heavy water production, reprocessing and waste management.

The present design of nuclear power plants is based on heavy water reactors using natural uranium as fuel. Heavy water, which has one extra neutron attached to each of the two hydrogen atoms, is thousands of times more efficient than ordinary or "light" water. Tarapur, India's first atomic power reactor, is the only one to use enriched uranium which produces energy more readily.

It consists of two 200 MW boiling water reactors and has completed 11 years of service.

The second power plant at Kota, in north west India, consists of two 220 MW reactors and was a joint venture with Canada. Indians were responsible for building and installing while Canadians supplied the designs and equipment.

India's nuclear power programme has not been governed by the convention that 600 MW is the minimum economic size for a nuclear power plant.

The largest plants set up so far are 470 MW which is felt to be an appropriate size for India's current needs. Dr Sethna expects that in future, instead of having twin reactors at one site, there would be more optimal use of the highly specialised manpower required to operate and maintain the installations if four reactors were located at a given site.

Nuclear power in India has not only been demonstrated to be an economically competitive and safe source of energy, Dr Sethna declares, but it has also "speeded up the scientific, technical and industrial development of the country as a whole."

The techniques developed for the extrusion of Zircaloy, a nuclear fuel, have been applied in the extrusion of alloy steel tubes for use in the petroleum industry, explains Dr Sethna.

The experience gained on nuclear projects has been transplanted to the field of civil construction, he adds.

Perhaps the most notable feature of India's nuclear power programme, which Indian officials are quick to point out to visitors, is the considerable degree of self reliance.

The trial and error approach was evident right from the start when a research reactor was designed and built wholly by Indians who had little experience in some of the techniques.

India has also gradually reduced the import component of its nuclear projects.

The import content of the first Kota unit for instance was 45 per cent while it is only nine per cent for the latest unit.

The third power station consisting of two 235 MW reactors now being put up near Madras is being built without reliance on foreign engineering or scientific expertise.

The fourth power plant being built at Narora in north west India also consists of two 235 MW reactors which have several new Indian-designed features, including building and reactor components which are earthquake-proof.

"India has reached the stage where its indigenously developed know-how can support all the required activities encompassing feasibility studies, site selection, detailed project design, construction commissioning and operation of any plant in the entire fuel cycle chain," Dr Sethna claims.

This trial and error approach undoubtedly has relevance for many developing countries which have tended to depend too heavily and perhaps indiscriminately on Western technology.

It is something Malaysia, which has sent many of its engineers and technicians to India for training in nuclear development, would do well to remember when it finally decides whether to take up the nuclear option.

CSO: 5100/8101

BRIEFS

GANDHI DENIES FRENCH URANIUM SUPPLY--The prime minister told the Rajya Sabha that every effort is being made to undertake research and development in all aspects of peaceful uses of nuclear energy and to keep the country abreast of the latest developments. Mrs Gandhi described as incorrect a newspaper report that the French Government had decided to consider favorably the question of supplying of enriched uranium for the Tarapur plant. [Text] [BK261125 Delhi Domestic Service in English 0830 GMT 26 Nov 81]

NUCLEAR-ARMS-FREE OUTER SPACE--United Nations, Oct 30 (PTI)--India yesterday urged that outer space, by agreement, must be kept free of nuclear weapons and nuclear testing of any sort. In addition, India also renewed strongly its plea for concluding two more agreements regarding nuclear weapons--an agreement on the total prohibition of the use or threat of use of nuclear weapons, and, a treaty prohibiting the testing of nuclear weapons in all environments, by all states, for all time to come. Indian ambassador to the United Nations at Geneva and India's representative at the disarmament talks A.P. Venkateswaran regretted, that, despite heightened awareness of the dangers of a nuclear war and its potential for the annihilation of mankind, there was delay in reaching consensus on concrete steps to avert such a danger. He said that the nuclear arms race was accelerating despite the achievement and maintenance of so-called strategic party. New weapon technologies had been spawned and incorporated into the nuclear arsenals of the nuclear weapons states, he said. Mr Venkateswaran referred to the development of missiles with more accurate warheads and the new neutron bombs by the United States and said the achievement of so-called strategic parity had not helped to halt the arms race. Calling for urgent measures for the prevention of a nuclear war, Mr Venkateswaran said the only real guarantee was for the nuclear powers to agree on a total prohibition of the use or threat of use of nuclear weapons under any circumstances. [Text] [New Delhi PATRIOT in English 31 Oct 81 p 3]

CSO: 5100/7016

UN ENVOY: POOR STATES MUST HAVE ACCESS TO NUCLEAR TECHNOLOGY

Karachi DAWN in English 12 Nov 81 pp 1, 12

[Text] United Nations, Nov 11--Pakistan told the General Assembly last night that the concern for nuclear non-proliferation should not militate against the inherent right of the developing countries to benefit from peaceful nuclear technology on a universal and non-discriminatory basis, reports APP's special correspondent.

"We believe that nuclear proliferation cannot be prevented by placing unilateral restrictions on access to nuclear technology," Ambassador Niaz A. Naik said.

That objective could be achieved through a genuine political consensus, embracing nuclear and non-nuclear countries, he said in a well-reasoned speech while discussing the report of the international Atomic Energy Agency (IAEA) Director-General, Mr Sigvard Eklund.

Mr Naik said Pakistan fully supported the IAEA safeguards system and, in the context of its own nuclear facilities, extended every assistance to the Agency in discharging its safebuard responsibilities. Nevertheless, in the recent past, Pakistan's peaceful nuclear programme had become the target of an "orchestrated propaganda campaign."

It was being said that "suspicious" activities had come to light at Pakistan's nuclear reactor near Karachi and that "anomalies and irregularities" had been detected at the site. Those were patently false allegations which cast doubt on the Agency's competence, the Pakistan Ambassador said.

These unfounded allegations, he said, should have been refuted by the Agency itself in the light of its inspections of the Karachi nuclear reactor. "We have, however, noted the categorical statement by the Director-General of IAEA that the Agency had neither detected any diversion nor any act of non-compliance of its safeguards regime."

The Karachi Nuclear Power Plant had been regularly inspected by the Agency's safeguards inspectors, Mr Naik stated. During the past 10 years, it had been inspected 62 times and on each occasion the Agency had certified that "the inspection disclosed no departure from the terms of the safeguards agreement covering the facilities and materials concerned."

There had not been a single case of non-compliance or deviation, he said. The conjecture regarding diversion of irradiated fuel from the nuclear power plant were totally baseless, misleading and contrary to the official statements and findings.

Mr Naik said Pakistan's experience showed that the IAEA safeguards system was reliable and effective, covering the entire nuclear fuel cycle. However, the safeguards system must be protected and universalised on a non-discriminatory basis.

The Israeli attack on the Iraqi nuclear reactor had come as a rude shock to the international community, he said. Director-General Sigvard Eklund had correctly described it as an attack on the IAEA safeguards system itself. The Israeli attack had far-reaching implications and underlined the imperative need to preserve the Agency's safeguards system and devise ways to protect all peaceful nuclear installations, he added.--APP

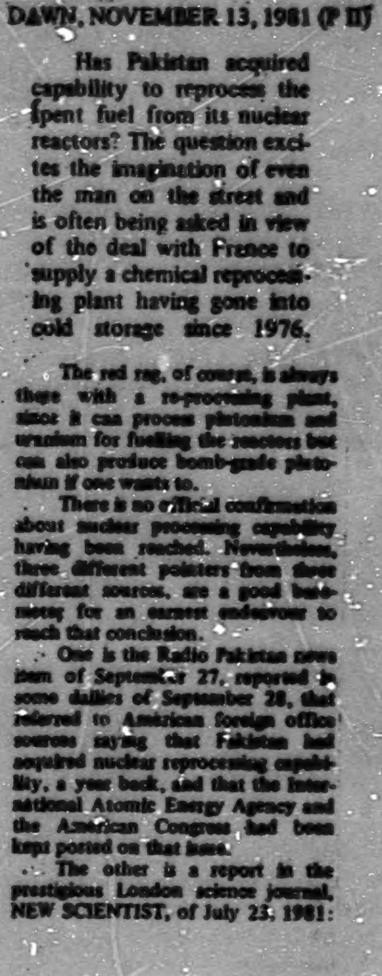
CSO: 5100/4505

SPECULATION ABOUT COUNTRY'S NUCLEAR REPROCESSING CAPACITY RIDICULED

Karachi DAWN in English 13 Nov 81 p 2

[Article by Azim Kidwai]

[Text]



DAWN, NOVEMBER 13, 1981 (P III)

Has Pakistan acquired capability to reprocess the spent fuel from its nuclear reactors? The question excites the imagination of even the man on the street and is often being asked in view of the deal with France to supply a chemical reprocessing plant having gone into cold storage since 1976.

The red rag, of course, is always there with a re-processing plant, since it can process plutonium and uranium for fuelling the reactors but can also produce bomb-grade plutonium if one wants to.

There is no official confirmation about nuclear processing capability having been reached. Nevertheless, three different pointers from three different sources, are a good barometer for an earnest endeavour to reach that conclusion.

One is the Radio Pakistan news item of September 27, reported by some dailies of September 28, that referred to American foreign office sources saying that Pakistan had acquired nuclear reprocessing capability, a year back, and that the International Atomic Energy Agency and the American Congress had been kept posted on that issue.

The other is a report in the prestigious London science journal, NEW SCIENTIST, of July 23, 1981:

"Intelligence experts in the US believe that Pakistan has secretly built a plant for reprocessing plutonium near Rawalpindi. This plant could provide enough fissionable material for a symbolically important test explosion without waiting for the completion of the large uranium enrichment plant being built at Kahuta, some 40 KM south of Islamabad. US intelligence experts believe that this plant will not be producing bomb-grade uranium before the end of 1983.

"Observers believe the secret plant was designed to make only 10 to 20 kilogrammes of plutonium a year--enough for three bombs at the most. The plant, which, the Americans believe is in the final stages of completion, is perhaps one-tenth the size of the commercial reprocessing plant that France agreed to sell to Pakistan six years ago. France cancelled the agreement under American pressure in 1979, but the Pakistanis managed to obtain the key items from French and Canadian companies before the new project was discovered."

AAEC report

The third source is the Australian Atomic Energy Commission Annual Report for the year ending June 1980:

"Pakistan is reported to be proceeding with completion of its reprocessing plant at Chashma. A contract for construction of a French company of a plant valued at U.S. dollars 250 million was cancelled after commencement of the concrete shielding cells and associated civil works".

All the three reports, when seen against one another, seem to be tangential, at times contradicting each other. But the idea central and common to all the three is that Pakistan has reached/is on the way to reaching the capability to fabricate its own reprocessing plant.

I, for one, have never felt apologetic on that account. The reason is simple.

Belgium has a reprocessing plant at Mol, working since 1966. But has Belgium ever fabricated or exploded a nuclear bomb?

Japan has a reprocessing plant at Tokai Mura for the last so many years. Have the Japanese staged a nuclear explosion?

Re-processing of nuclear fuel should, therefore, be viewed as a sophisticated, technical capability, which any country that aspires for a sizeable nuclear programme, need have, particularly, if it believes in self-reliance. And Pakistan falls in that category.

One feels like asking the very pertinent question: Why Pakistan, that can fabricate its own fuel for KANUPP, should not have a reprocessing plant? Reprocessing of spent fuel is perhaps not such an arduous technical task as fabricating nuclear fuel for reactors.

The argument that a reprocessing plant can also yield bomb-grade plutonium if one so desires and so, is a forbidden fruit for the developing countries, is a very lousy one and hardly just or tenable. That way, one shouldn't be with a match-box. For, you can well put to fire someone else's house with a burning match-stick, if you so wish!

Writing in these columns as early as 1978 (DAWN, Dec. 1, 1978), we had argued on that point and those arguments are as valid today when Pakistan appears to be inching its way towards reprocessing capability, as we were three years back:

"But all said and done, the dilemma of over-riding importance to most nations, particularly the developing ones with little oil or coal, is that no matter how the world's energy cake is sliced for them, there is always less of it to eat every year. The tentacles of the energy hydra are a scare for them, and they are prepared to take risks, and to gamble on accounts that may even appear perilous".

"Perhaps the nuclear think-tank in Pakistan is also facing the same dilemma and is seized of the energy problem. Pakistan's motivations in not giving up reprocessing inspite of great pressures, may be the same as of many countries of Europe – to accumulate and build up an inventory of plutonium for their breeder programme, may be, 5 or 10 years hence, and also to fuel their enriched uranium reactors of the future through it."

Contradiction

The three reports from three different sources referred to earlier, are interesting because of the elements of contradiction therein.

While the American intelligence scoop times the "capability" to have been attained a year back, the Australian AEC thinks that "Pakistan is proceeding with completion of its reprocessing plant at Chashma" at that very point of time. Both appear as no more than wild guesses, as few would be led to believe that Pakistan would be working on the plant that was under a contract with France (the contract has not been annulled; it is only in abeyance).

The New Scientist story belies it any way, when it says that the plant is "one-tenth" the size of the plant contracted with France.

Supposing Pakistan is on the way to fabricating a small reprocessing plant on its own to get a feel of the reprocessing technology, why should the work be graded as something sinister. Why are not Belgium and Japan in the dock on that account?

The funny thing is that the neighbouring country, India has had two reprocessing plants – at Trombay and Tarapur – working for almost two decades. One was an imported one, the other locally fabricated. A third of 100-ton capacity is on the anvil at Kalpakkam, near Madras. What is India going to do with three reprocessing plants, one may ask those who see only the red rag in a supposedly modest programme of reprocessing in Pakistan?

The bogey of uranium enrichment in Pakistan with sinister overtones has somehow gone into low key, as according to the great Delphian pundits abroad, Pakistan should have detonated a uranium "Islamic" bomb long ago – atleast a year back. The prediction has boomeranged and back-fired that way, and there is not much left in fabricating stories on the centrifuge line.

It is now the turn of a plutonium bomb through reprocessing technology!

Politics doesn't fall within the ambit of a science column, nor polemics goes along with its character. The only general remark a science columnist can, therefore make in the interest of the technological progress of the country, is that let the caravan move on and on in the nuclear field. The dogs bark in any case.

CSO: 5100/[illegible]505

BRIEFS

NUCLEAR RESEARCH ORGANIZATION PROTOCOL--Hanoi, 18 Nov (VNA)--A Vietnamese delegation led by Minister of Secondary Vocational and Higher Education Nguyen Dinh Tu has signed a protocol on Vietnam's participation in an agreement on the establishment of an interim international organization to coordinate research on reactor physics. The protocol was signed in Leipzig, the German Democratic Republic, during the 41st session (November 10-13) of the Permanent Commission for the Peaceful Uses of Atomic Energy of the Council for Mutual Economic Assistance. [Text] [OW190751 Hanoi VNA in English 1524 GMT 18 Nov 81]

CSO: 5100/4506

WIDER USE OF HEAT OUTPUT OF NUCLEAR POWER STATIONS PLANNED

Prague SVET HOSPODARSTVI in Czech 26 Jun 81 pp 1, 2

[Article by Eng Miroslav Cibula, SPK (State Planning Commission): "More Extensive Use of Nuclear Energy"]

[Text] In accordance with the conclusions of the 16th CPCZ Congress, by 1985 the installed power of Czechoslovak nuclear power stations is to be increased to 3,250 MW. This will make it possible for nuclear power stations to produce more than 90 percent of the total increase in electrical power generated in Czechoslovakia during the Seventh Five-Year Plan and gradually to achieve a saving of about 17 million tons of power-production-grade brown coal.

The efficiency of utilization of the heat output of nuclear power stations which use the condensation method of producing electrical energy currently is only about 30 percent, as in the case of steam boilers in conventional condensation-type power stations. Accordingly, there is considerable potential for use of this installed power other than for generating electricity. The state special-purpose program for increasing the efficiency of fuel and energy consumption is devoting special attention to converting condensation-type power stations to combined production of electrical energy and supplementary heat, which will considerably increase the upvaluation of the primary energy sources used and the effectiveness of the investments made. In condensation-type nuclear power stations, for example, there exists the possibility of supplying heat by nonregulated withdrawal from condensation-type steam turbines while assuring reliable and safe operation, at the cost of small additional investments to reconstruct the equipment. This involves the transfer of heat to centralized heat supply systems in the form of hot water by means of tertiary heat exchangers.

To organize the multiple use of nuclear power stations under Czechoslovak conditions, Energoprojekt [power facility design organization] Praha has broken down the possible types of heat supply into four categories. The first category consists of the waste heat contained in cooling water at 25° to 43°C, depending on the time of year, weather conditions and the power station's operating regime. It is proposed to use this waste heat in agricultural and foodstuff complexes for heating soil from below in greenhouses and certain open-air crop cultivation areas (thermal reclamation), for heating hothouses, for integrated nourishment of soils with hot irrigation water, for frost protection of orchards and vegetable plots, for cultivation of edible mushrooms and for warm-water raising of fish and fry.

In the second category is heat between 50° and 60° (or 80°), which can be used in temperature regulation in heated agricultural facilities. This heat may be obtained either by the heating of cooling water, using steam from unregulated withdrawals from the low-pressure sides of condensing turbines, or by cascaded use of the hot water facilities of a centralized heat-supply system with long-distance hot water loops. Depending on the economic conditions of the locality, noncycling heat supply may also be possible by making use of the total temperature drop or by building an additional recirculating system with separate withdrawal of heat from the heat-supply system. It is proposed to use heat in this category to heat greenhouses, hothouses and vegetable storehouses and semifinished products of the canning industry, as well as a source of process heat for composting, fermentation, biological purification of wastewater, heating of irrigation water and heating of auxiliary production facilities.

Waste heat and adjusted low-energy heat in the first and second categories represent the primary source of conservation in the national economy and of increased effectiveness of the investments in condensation-type power stations, additional investments in heat supply and investments in agricultural and foodstuff complexes, because this heat represents a secondary energy source with no requirement for a primary fuel source (conventional or nuclear fuel). Large quantities of this heat are concentrated in the vicinity of condensation-type nuclear power stations, and heretofore here escaped into the atmosphere as lost energy. For example, in the vicinity of some existing Czechoslovak nuclear power stations such heat amounts to 100-200 PJ per year, which is equivalent to 7-14 million tons of power-production-grade brown coal. The use of only 10 percent of this heat would represent an energy gain considerably greater than our capabilities for further expanding coal extraction. Despite the fact that the sources of this heat are localized at the sites of existing or under-construction power stations and that for the most part they can be used only in specially equipped consumption areas, our power situation requires a fundamental change of attitude toward the use of such waste heat sources. This involves primarily changes in the development concepts of potential consumers, particularly as regards the construction of crop and livestock production facilities, food industry facilities and services in areas near nuclear power station sites. This cheap heat may be effective in increasing domestic food production and may help decrease food imports from abroad, which in many cases are paid for by exporting energy-intensive heavy industry products.

The third and fourth categories of heat which could be supplied from nuclear power stations include heat intended for centralized heat supply systems at 120° to 180°C, in the form of hot water or steam, with parameters depending on needs and the distance to the consumer. The technology of heat supply from nuclear reactors in Czechoslovakia in the form of steam has not as yet been worked out. Supply of heat in the third and fourth categories from nuclear power stations would involve some decrease in the output of electrical energy, but would increase the efficiency of utilization of the installed thermal output of nuclear reactors and of nuclear fuel.

According to data from the concern Slovenske energeticke podniky [Slovak Power Production Enterprises], combined production of electrical energy and heat would increase the efficiency of utilization of the thermal output of the four

VVER 440 [440-watt water-cooled water-moderated] nuclear reactors in Jaslovske Bohunice from 31 percent to 40 percent. This would involve delivery of heat to centralized heat supply systems in Trnava, Piestany, Nove Mesto nad Vahom, Leopoldov and Hlohovec in an amount equivalent to 1.4 tons of power-production-grade brown coal. With comprehensive utilization of heat-supply capabilities in this cluster, including delivery of low-energy heat and its utilization in the municipal area, and in industry and agriculture in Trnava Okres, the effectiveness of utilization of the nuclear reactors' heat output would increase to 52-64 percent. This would mean a heat use efficiency twice as high as with purely condensation-type production.

The 22-km Jaslovske Bohunice-to-Trnava hot-water-heat supply line with a capacity of 240 MW of heat is to be built in 1983-1986. Economic evaluation of the plans for this first facility in Czechoslovakia for heat supply from a nuclear power station indicates substantially better results than for the initial planning alternative involving construction of a coal-fired heat-supply station in Trnava, although it does not take account of additional extra-economic environmental effects. In the next stage of implementation of this concept it is planned to build hot-water pipelines of the same capacity to Piestany and Nove Mesto and Vahom.

At the suggestion of FMTIR [Federal Ministry of Technical and Investment Development] and CSKAE [Czechoslovak Atomic Energy Commission], planning documentation for an experimental nuclear-heated agricultural base in Jaslovske Bohunice has already been prepared; its construction would create the conditions for judging the economic effectiveness of agricultural investments in wide-area use of low-energy heat sources from nuclear power stations.

The design proposals for the secondary circuit of the Mochovce nuclear power station in Levice Okres call for delivery of 1,020 to 1,060 MW of heat in the form of hot water at 130°/60°C, which is 2.5 times higher than the okres' estimated heat consumption for 1995.

Similar plans are being prepared for the purpose of increasing the efficient use of the heat output of nuclear power stations in the Czech Republic, namely at Dukovany in southern Moravia and at Temelina in southern Bohemia.

Full utilization of the thermal energy available in areas where nuclear power stations are being constructed requires timely creation of suitable conditions for the withdrawal of large quantities of heat by means of construction of centralized regional systems for supplying heat to industry and the public, guidance of the construction of local fossil-fired heat sources, guidance of the development concepts of heat consumers, and suitable siting of new nuclear power stations. In addition, it is also necessary to arrange for the use of low-energy waste heat, particularly by concentrating agricultural and foodstuffs plants in the vicinity of nuclear power station sites. The economic conditions for topping this heat would be very favorable. The problems involved are being steadily solved in the process of selection of the sites for future nuclear power stations by regional planning bodies and the investor organizations.

8480
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CZECHOSLOVAKIA

PROBLEMS IN NUCLEAR PLANT CONSTRUCTION DISCUSSED

Prague RUDE PRAVO in Czech 21 Oct 81 p 1

[Editorial: "The Most Important Construction Projects"]

[Text] By the completion of Prunerov II energy center in 1982 the era of construction of conventional steam power plants using solid fuels will come to an end in our country. This will conclude the stage of construction of energy sources which primarily use the immense deposits of brown coal in the basins under the slopes of the Ore Mountains (Krusne Hory) for production of electricity.

For the next few decades, the conventional power plants will still remain the principal producers of energy needed for our industry, transportation and households. For several decades more it will be necessary to spend considerable funds and concentrate great work effort on the exploitation of the natural wealth which still constitutes the basis of our fuel supply.

Coal is the principal source for production of electricity. We made use also of the power of our rivers. The installed output of hydroelectric power plants, however, now yields its second place in the ladder to nuclear energy which represents a long-term and, in many respects, more advantageous solution [to our energy shortage]. This has been practically borne out by the operation of the first Czechoslovak nuclear power plant at Jaslovske Bohunice.

The decision on meeting the energy needs of our economy in the future by the construction of nuclear power plants was motivated not only by the fact that the domestic deposits of solid fuels will be depleted within the next few decades, but also by the fact that the construction of additional conventional power plants would intolerably deteriorate the living environment already made bad enough both by mining activities and operation of steam power plants which still have not managed to solve the problem of desulfurization of escaping polluting fallout.

We are carrying out the grandiose plan of construction of nuclear power plants with effective cooperation and assistance of the Soviet Union which possesses long-term and invaluable experiences in their construction and manufacture of necessary equipment. For this reason, the Czechoslovak-Soviet agreement on cooperation in the construction of nuclear power plants in our country and manufacture of equipment designed for other socialist countries is of foremost importance for us.

At the present time, we are constructing the V2 nuclear power plant in the neighborhood of the already operating V1 at Jaslovske Bohunice, and the third nuclear power plant at Dukovany in southern Moravia is also under construction. The building sites are being prepared for the construction of additional nuclear power plants in southern Bohemia and southern Slovakia. It is anticipated that the nuclear power plants will produce almost 20 percent of needed electricity by the end of the Seventh Five-Year Plan and fully 33 percent by the end of the Eighth Five-Year Plan. While the power plants using solid fuels will supply the distribution grid with 75 percent of electricity in 1985, their share will decline to less than 60 percent by 1990. This reflects not only the anticipated decline in the exploitation of conventional resources, but above all the high responsibility entailed in the construction of nuclear power plants during the intervening years.

The planned development of nuclear energy and its implementation assumes extraordinary importance also by the fact that our fuel-energy balance cannot expect a further increase in the share of refined fuels, such as crude oil and natural gas, but rather a decrease due to the more effective use of these raw materials in the petrochemical industry and other chemical processes. The development of nuclear energy also represents the best way for intensified protection of the living environment in the entire state and particularly in the coal basins.

The program of construction of nuclear power plants up to 1990 is based on the program of CSSR-USSR cooperation in the area of nuclear energy up to 1990 and appropriate agreements on mutual cooperation in the design, construction and operation of individual power plants. It provides for the construction of 12 units with VVER 440 reactors and 2 units with VVER 1000 reactors, which represents an overall installed output of 7,280 MW, 3,080 MW of which should be available by 1985. The implementation of this program both in terms of the total installed output and particularly the deadlines set for putting individual capacities into operation is a very demanding task which is indispensable for the development of the national economy and therefore of utmost importance.

The past progress in the construction of nuclear power plants, however, does not correspond to our needs because we have failed to centralize, to the necessary extent, construction and assembly capacities, and to adhere to specific deadlines set for individual stages of construction. The difficulties stem from the fact that the design and preproduction preparation of construction projects is not completed on time and suffers from various shortcomings both of a construction and technological nature because the principal suppliers have not earmarked sufficient capacities for this purpose. Shortcomings appear also in the management of the actual investment process of construction.

It is true that the construction of nuclear power plants is very difficult and calls for accuracy and high quality of work. It requires a great deal of time both during the period of preparation and during the actual construction. On the other hand, however, the construction program has been well-known already for a sufficiently long time and the assigned tasks are familiar to the respective economic production units and enterprises such as sectoral enterprises Skoda Plzen, Vitkovice, First Engineering Plant in Brno, Industrial Projects Brno and others. Despite several changes in the original design, there is no excuse for the delays in the actual construction of Dukovany plant, for example. Several months' delay in putting the units into operation represents a loss in production of electricity of approximately 3 billion kilowatt hours in the last 3 years of the Seventh Five-Year Plan, which is the final analysis will necessitate the reduction of electric energy consumption and an increase both in the use of conventional power plants and coal output.

No less serious appears to be the situation in the preparation of additional capacities in southern Slovakia and southern Bohemia, which will virtually represent the only increase in the basic power plants' output during the Eighth Five-Year Plan. The delay in the preparation cannot be made up for by other power-generating capacities within the specified deadlines. If it is not compensated for by the intensification of all work, it will have extraordinarily serious consequences for the smooth supply to the national economy and households during that period.

The present situation thus requires that all levels of management of the national economy pay maximum attention to the implementation of the program of nuclear power plant construction. Nuclear power plants definitely are the most important construction project in our country and must, therefore, be given priority in all sections of the economy. It is construction which profoundly affects the overall fulfillment of the urgent tasks of our economy, although its positive effect will be noticed only after several years. It is necessary to realize particularly that any underestimation of even the smallest task now will necessarily multiply the difficulties several years later and this must be averted under any circumstances.

The construction of nuclear power plants unconditionally calls not only for making up for the delays in construction and production losses, but also for adhering strictly to the specified construction deadlines. The nuclear power plants will be the only source of increased electricity production in the future and every violation of construction schedule would have injurious consequences for the supply of electricity, which is the decisive energy obtainable from domestic resources. For this reason, all organizations participating in the construction of nuclear power plants must always bear in mind that all tasks, no matter how small, must be unconditionally fulfilled.

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CSO: 5100/3002

NUCLEAR FUEL CYCLE STRATEGY FOR YUGOSLAVIA EXAMINED

Belgrade ELEKTROPRIVREDA in Serbo-Croatian No 7-8, Jul-Aug 81 pp 196-205

[Article by Naim Afgan and Dusan Spasojevic, Boris Kidric Institute for Nuclear Sciences, Vinca]

[Excerpt] What Possible Strategies Are Available to Yugoslavia?

If we are to answer this question, we must introduce certain assumptions whose purpose is to help us to quantify our reflections. We will assume, that is, the following:

a. that a uniform fuel cycle will be adopted in Yugoslavia for all power plants built up to the year 2000,

b. that nuclear power plants with a total capacity of 6,000 Mw(e) will have to be built in Yugoslavia up to the year 2000,

c. that the schedule of their going on line will be such that beginning in 1990 one plant with a capacity of 1,000 Mw(e) will go on line every 2 years (Figure 4),

d. that construction of infrastructural facilities will be governed by a planning that puts them into service when the needs attain the minimal economic capacity. The plans moreover call for construction of modular units of capacity.

In the light of these assumptions and also experience in the world to date, that is, the current international conditions for the purchase, acquisition and assurance of raw materials and services to meet the needs of the nuclear fuel cycle, we have in this discussion systematized and evaluated the following possibilities:

i. Fuel Elements Acquired Abroad and Returned to the Seller When Spent (Variand 1)

This variant presupposes that a long-term contract would be signed with a potential supplier of fuel elements to furnish fuel elements according to the varying needs of each nuclear power plant. This type of arrangement is most common in the practice of the countries of the eastern bloc. This method of assuring fuel is also used when nuclear power facilities are sold to certain less developed countries for the first nuclear power plants in the country (Korea, Taiwan, Spain).

The funds that would have to be planned for the assumed schedule of construction of nuclear power plants in Yugoslavia is as follows: U.S. \$70 · 10^6 in 1990; U.S. \$104 · 10^6 in 1992; U.S. \$207 · 10^6 in 1998; U.S. \$241 · 10^6 in 2000. Figures 5 and 6 show the needs for uranium concentrate for power plants with a heavy-water and light-water reactor.

ii. The Uranium Is Furnished in the Country or Abroad, and We Have Our Own Fuel Administration for Fabrication of Fuel Elements Abroad (Variant 2)

The Krsko NE [Nuclear Power Plant] is using this method of obtaining uranium and services for processing and fabrication of fuel elements. This is predicated on the need to work out a long-term arrangement with those who have the installations necessary for processing the fuel. On the basis of the terms and conditions now in effect of the countries which possess plants for isotope enrichment of uranium, the purchasing country must assume the obligation that it will seek consent of the country selling the services for the reprocessing of spent fuel. It follows from this that enlarged capacities will have to be built for storage of the irradiated fuel at each nuclear power plant, and at the same time provision will have to be made to build separate facilities for storage of the irradiated fuel.

This variant for furnishing fuel is the usual practice in the case of reactors using natural uranium where reprocessing of the fuel is not at present necessary.

Should we decide in the coming period to commit ourselves to furnish enriched fuel in this manner for all future reactors envisaged by the schedule, then we must plan the following financial resources for uranium concentrate: U.S. \$60 · 10^6 in 1991; U.S. \$98 · 10^6 in 1995; U.S. \$116 · 10^6 in 2000. The following resources will have to be planned for enrichment: U.S. \$32 · 10^6 in 1991; U.S. \$56 · 10^6 in 1995; U.S. \$70 · 10^6 in 2000. The following amounts will be necessary for fabrication of fuel elements: U.S. \$19 · 10^6 in 1991; U.S. \$24 · 10^6 in 1995; U.S. \$28 · 10^6 in 2000. The following resources will also have to be planned for the shipment and storage of fuel elements: U.S. \$10 · 10^6 in 1995 and U.S. \$19 · 10^6 in 2000. Here we can expect that the raw materials could be purchased domestically, while the services of fuel cycle plants would have to be obtained abroad.

The case of the nuclear fuel cycle for power plants with heavy-water reactors would require in this variant planning the following resources for raw materials: U.S. \$34 · 10^6 in 1991; U.S. \$70 · 10^6 in 1995; U.S. \$100 · 10^6 in 2000. It would at the same time be necessary to provide the following funds for fabrication of fuel elements: U.S. \$10 · 10^6 in 1991; U.S. \$15 · 10^6 in 1995; U.S. \$20 · 10^6 in 2000.

Raw materials might also be obtained in the country for reactors with enriched uranium, while the fuel elements would be fabricated abroad.

It follows that about 58 percent of all the resources needed for the fuel cycle with enriched uranium might be obtained within the country, while for the fuel cycle with natural uranium this amount would be about 75 percent, not counting the heavy water.

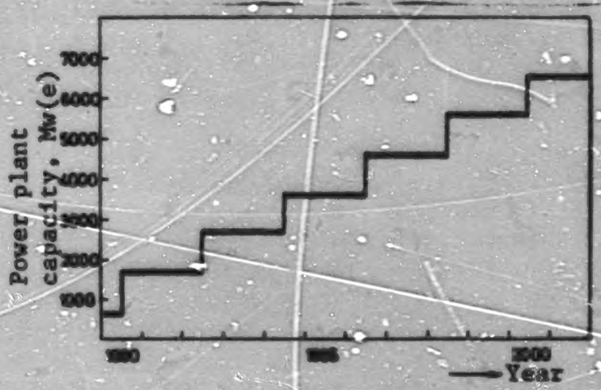

Figure 4. The scenario under consideration for construction of nuclear power plants in Yugoslavia.

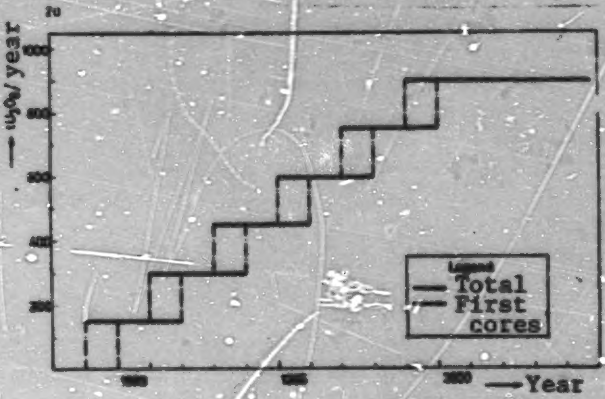

Figure 5. Uranium concentrate needs for power plants with heavy-water reactors.

iii. Uranium Obtained Within the Country or Abroad, Isotope Enrichment Abroad and Fabrication and Stockpiling of Fuel Elements Within the Country (Variant 3)

This variant is based on the assumption that at some point in time we will commence construction of the infrastructural facilities of the fuel cycle. Since the technology for fabrication of fuel elements is commercially available even today, the only question that arises is when our needs will reach the threshold of an economically suitable capacity. As concerns the fuel cycle, this variant has no difference except the limitation on the reprocessing of spent fuel, which will continue to exist for enriched uranium fuels, if the uranium is enriched abroad.

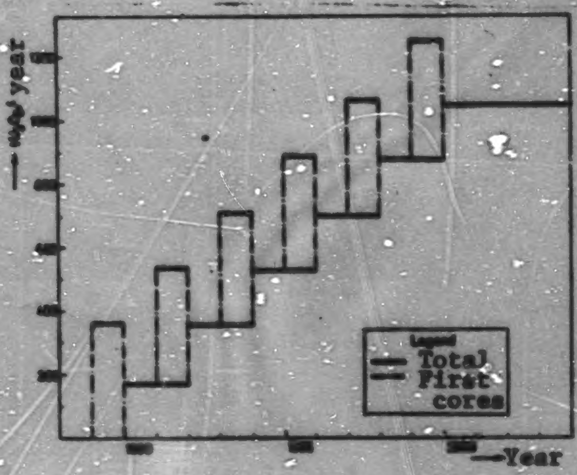

Figure 6. Uranium concentrate needs for power plants with light-water reactors.

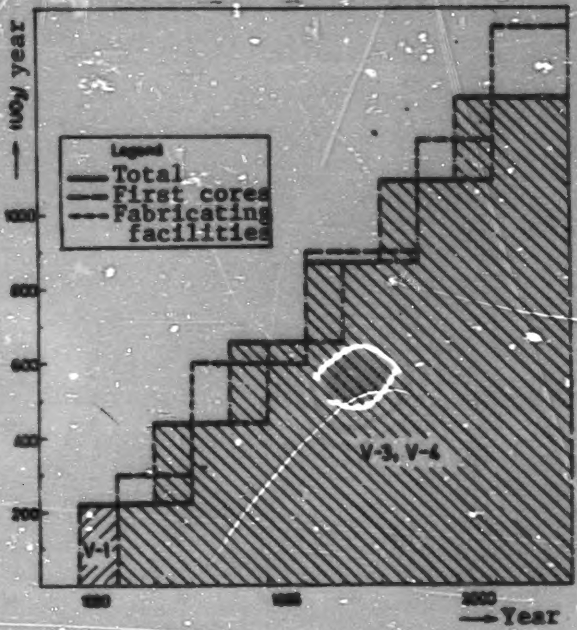

Figure 7. Obtaining fuel elements for power plants with heavy-water reactors.

Figures 7 and 8 show the needs for fuel elements for power plants with heavy-water and light-water reactors.

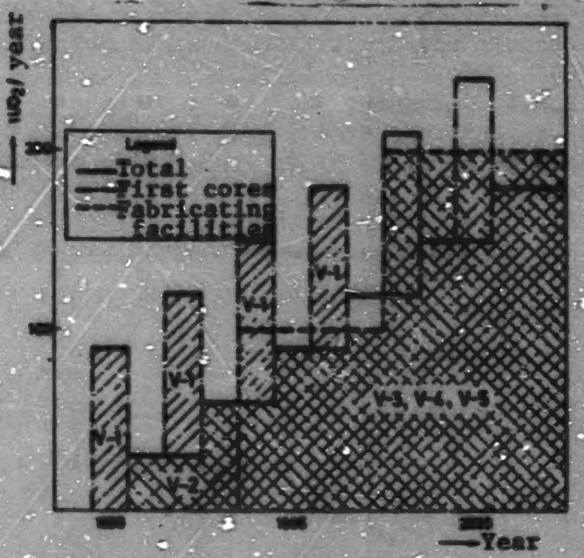

Figure 8. Obtaining fuel elements for power plants with light-water reactors.

The calculation is based on modular construction of the plant for enriched fuel elements, and a capacity of 100 tons per year would be in production in late 1993, while the next 100 tons per year would go into production in 1998. It is assumed here that the first cores for the first three power plants would have to be purchased abroad along with the appropriate number of changes until the first phase of the fabrication plant goes into operation.

Modular construction of the plant can also be assumed for production of natural uranium fuel elements. The first module of 200 tons of output per year would have to go into production by late 1990, and a capacity of 200 tons per year would be added every 2 or 3 years thereafter, so that at the end of the next decade a capacity of about 1,000 tons per year would be in operation.

Again in this version power plants with reactors for isotope-enriched uranium would require that provision be made for long-term storage of fuel elements so that in the case of natural uranium fuel elements it would be possible by 1993 to build a fuel reprocessing plant justifying modular construction with output increments of 300 tons per year.

The costs of raw materials in the fuel cycle for enriched fuel would be the same as for Variant 2. Much the same is true of the costs of enrichment services and production of heavy water. Construction of our own plants for fuel production make it possible for a portion of the costs of fabricating the fuel element to be incurred within the country for both enriched and natural fuel.

iv. Uranium Obtained Within the Country or Abroad, Isotope Enrichment Abroad, But Domestic Fabrication of Fuel Elements, Fuel Reprocessing and Fabrication of Fuel Elements on the Basis of MOX Fuel and the Treatment of RAO [radioactive waste] Within the Country (Variant 4)

This variant assumes that the fuel must be enriched abroad, but at the same time there are no obstacles to reprocessing the fuel and fabricating fuel elements on the basis of plutonium. In the case of natural uranium, this variant offers the possibility of becoming completely independent.

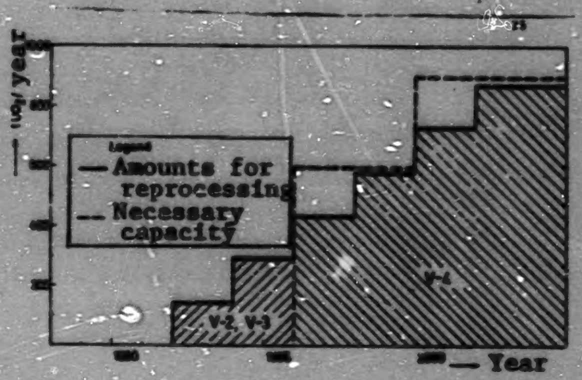

Figure 9. Reprocessing of irradiated fuel from power plants with heavy-water reactors.

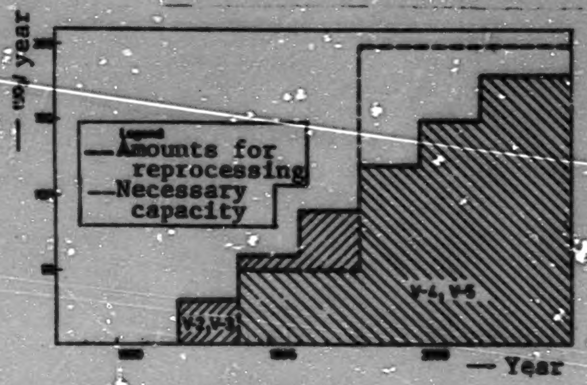

Figure 10. Reprocessing of irradiated fuel from power plants with light-water reactors.

Figures 9 and 10 show the amounts of fuel arriving for reprocessing from power plants with heavy-water and light-water reactors.

The fuel cycle with enriched uranium requires in this variant that fuel reprocessing begin as early as 1995 with a plant whose output is 50 tons per year, and then in 1998 a plant would be put into operation with another 150 tons per year. The assumption here is that the plant with an output of 50 tons per year would be an industrial-scale pilot operation.

For the natural uranium fuel cycle plans called for building a modular type of fuel reprocessing plant as follows: the first capacity of 300 tons per year would go into operation in 1995, and a plant with an output of 300 tons per year would go into operation every 3 years thereafter. It should be stated in this connection that the simplicity of storing the natural uranium fuel elements and the considerably lower value of raw materials contained in them provides for greater flexibility in scheduling the opening of fuel reprocessing plants.

We need to emphasize here that along with the fuel reprocessing plants, there is a need to make provision for the appropriate capacity of an installation for storage and treatment of RAO.

Fuel reprocessing would create the conditions necessary for production of fuels on the basis of plutonium. Their use in thermal reactors makes it possible to reduce consumption of natural uranium by about 25 percent, and this would at the same time diminish the need for isotope enrichment of fuel. Though the economic side of the production of this type of fuel is still uncertain, we can confidently expect that in the coming period substantial use will be made of this fuel, especially in countries which do not expect to introduce fast ones at an early date.

v. Obtaining the Uranium and Accomplishing All Phases of the Fuel Cycle Within the Country (Variant 5)

It is the goal of every country planning introduction of nuclear power to possess the necessary amounts of uranium and corresponding plants for processing and reprocessing the nuclear fuel. In our situation and for the assumed program based on the scenario we have presented, this can be done only in 1998, while for reactors with natural uranium these conditions will be fulfilled in 1995. It is assumed here that the fuel reprocessing plant is the limitation. It follows that this variant for uranium reprocessing does not differ from Variant 4. With respect to the enriched uranium fuel cycle this means that it would be necessary to commence operation of our own plant with a capacity of 0.5 · 10^6 JSR/year in 1992, and the plans would call for building the second part of that plant, with a capacity of another 0.5 · 10^6 JSR/year, by 1998 (Figure 11). This makes it possible to add to this plant new modules whose capacity would be in line with the projected program. It follows that for the first three power plants in the assumed program it will be necessary to lease capacities for isotope enrichment of the fuel abroad. It will also be necessary to provide isotope enrichment for replacements for power plants which will be built before the isotope enrichment plant is put into operation. For the other installations of the fuel cycle this variant corresponds to the requirements set forth for Variant 4.

What Commitments Determine the Nuclear Fuel Cycle Strategy?

Before answering this question we need to examine on the basis of the scenario that has been adopted for nuclear power plant construction which commitments are indispensable to the possibilities examined for furnishing nuclear fuel.

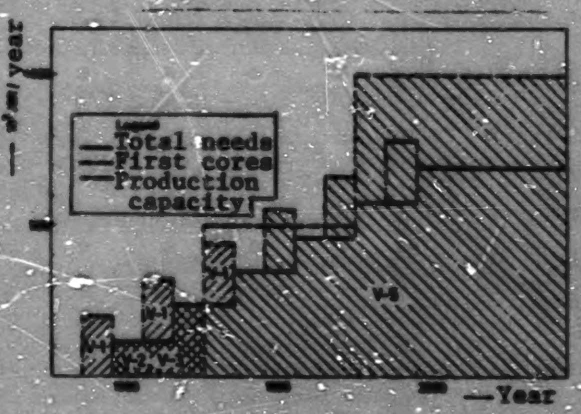

Figure 11. Isotope enrichment of uranium for power plants with light-water reactors.

Certainly the first commitment is related to furnishing raw materials. And, as we see, for the scenario that has been selected, whether we are talking about the heavy-water type or light-water type of reactor, the amounts of uranium concentrate needed are such as to require that this job begin as soon as possible and be conducted on a scale which will afford us the possibility of satisfying our future needs. In this connection a clear commitment should be made to purchasing uranium from all available sources which do not impose additional conditions. However, over the long run the commitment should be made above all to domestic sources and to sources in developing countries where we might sell our technology. A commitment also needs to be made in line with the needs to the development and adoption of a technology for processing the ore and also for converting it into a suitable form for fabrication of fuel elements. Considerable attention must be paid to secondary raw materials, especially to adoption of a common technology. The present lack of known uranium reserves makes it necessary that we orient ourselves toward mastering those technologies which will make it possible for us to furnish the largest possible amounts of uranium from the plants and raw materials which we possess in the country.

The second commitment which does not depend on the choice of the nuclear fuel cycle is that we build jointly in the country those fuel cycle plants for which there exist in the world available technologies which can be purchased without additional restrictions. The capacity of these plants and the timing of their construction is to be determined according to the needs of our joint program for nuclear plant construction. This group would include above all a plant for fabrication of fuel elements. For the scenario of nuclear power plant construction we are analyzing, it is possible to determine the capacity and construction schedule of these plants regardless of whether we are talking about natural or enriched uranium fuel.

The third commitment which does not depend on choice of the conception of the reactor system is the need to undertake development of a long-range conception and development of technology for processing, treatment and storage of radioactive waste. It is well known that RAO can be divided into two groups, as follows: RAO from nuclear power plants and RAO from fuel reprocessing. We will encounter the first group of RAO when the nuclear installations commence operation, while the second group will be the object of our attention only when the fuel reprocessing plant goes into operation. However, this offers us an opportunity through our involvement with the first group of RAO to master the techniques and technologies which we will need in treating, processing and storing the RAO coming from the fuel reprocessing installations.

The second group of commitments are those which are directly related to selection of the fuel cycle strategy. The first commitment in this group is this: whether or not to commence reprocessing of the spent fuel, and when. It follows that according to the scenario selected, the reprocessing of irradiated fuel could begin in 1995--and in 1993 for heavy-water reactors. However, if we take into account the schedule for construction of these facilities as a necessity if through our own development we are to master technologies for reprocessing spent fuel, then it is realistic to assume that these projects are optimistic and that shifting them 5 years provides a more realistic variant of the scenario. However, it should be emphasized in this connection that regardless of when construction of these plants needs to begin, our commitment to the desire to reprocess the fuel must be evident even today, since only in this way can we ensure that we can count on construction of these plants when that becomes feasible.

The key question in selection of the fuel cycle with natural uranium or the one with isotope-enriched uranium is related to the process of isotope enrichment of uranium and heavy water. It is evident from the scenario we have been examining that the first phase of the enrichment plant would have to be in operation as early as 1993, while heavy water production should commence as early as 1989. This commitment has considerably broader dimensions than the schedule for construction of these plants, and therefore we wish to present certain questions which can have a bearing on the commitment in this area.

The processes of heavy water production are considerably more simple and considerably smaller in capacity than the corresponding plants for enrichment, assuming the same scenario for construction of nuclear power plants. This offers the possibility of mastering those technologies of the nuclear fuel cycle more rapidly and of building the appropriate plants. If we add to this the somewhat smaller requirement for uranium raw materials, then it is certain that this strategy is more suitable to countries with a rather scanty economic potential, countries which moreover want to emancipate themselves in the shortest possible time.

Enriched fuel opens up far broader opportunities for application of differing design features in reactor construction. Opportunities are created thereby for choosing several partners for potential collaboration, since it is possible to adjust the fabrication of fuel elements to each individual reactor, which is in fact done in practice. It follows that this choice would be more suitable from the standpoint of potential polyvalence and broader linkage with various partners.

We would like in conclusion to emphasize that the fuel cycle, regardless of the scenario chosen for construction of nuclear power plants, will depend less and less on the available raw materials and more and more will be related to possession of the appropriate knowledge about technologies for processing them. Let us be permitted, then, to quote in conclusion the words which Comrade Tito uttered in a wartime conversation: "that the important thing in life is to decide, since things in life become most difficult when no decision is made."

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CSO: 5100/3003

MORE ENRICHED URANIUM TO BE PURCHASED FROM URENCO

Rotterdam NRC HANDELSBLAD in Dutch 13 Oct 81 pp 1, 11

[Report by Roel Janssen]

[Text] According to political sources in Brazil, the Brazilians have definitively decided on enriched uranium for their atomic powerplants from the West European consortium URENCO [Uranium Enrichment Co], of which the Netherlands is a member. Brazil is said not to expect enriched urnaium from the United States because the Brazilians do not want to submit to the security demands which the Americans tie to deliveries.

Brazil does not want to designate the URENCO uranium solely for the Angra II and III atomic powerplants as originally intended, but for the Angra I powerplant as well. This powerplant, built by the American firm Westinghouse, is to begin operations at the end of this year.

On the basis of an agreement between the United States and Brazil concluded in 1972, Angra I was to be fueled with American enriched uranium. The first shipment was received by Brazil in 1979, but after that the United States registered objections to further deliveries on the basis of the Nuclear Nonproliferation Treaty ratified in 1978. The Americans want Brazil to accept so-called "full-scope safeguards," which is to say that Brazil would have to submit all of its nuclear activities to international control.

For reasons of principle, Brazil wants only to accept complete security requirements with each nuclear agreement, but refuses to subject itself in advance to total control.

Because of this the United States-Brazilian negoitations about further deliveries of enriched uranium reached an impasse. The Brazilians feel that the United States is legally obligated to honor the 1972 agreement, which after all antidates the 1978 Nuclear Nonproliferation Treaty.

During his visit to Brazil last month the U.S. undersecretary of state for Latin American affairs, Thomas Enders, promised that the United States wants to become a reliable partner to Brazil again in the area of atomic energy. Apparently the Brazilians did not place much reliance in that, and have sought contacts with URENCO in the meantime, with which an agreement was concluded in 1978 to provide the atomic powerplants Angra I and II--built in accordance with the Brazilian-FRG nuclear treaty--with enriched uranium.

In political circles in Brazilia the chances of reaching agreement even now with the United States are regarded as minimal. According to Cesar Cals, the Brazilian minister for mining and energy, the enriched uranium which had originally been designated for the Angra II powerplant, which will not enter service on time, will be accepted normally on time and used for Angra I.

A URENCO spokesman in Almelo confirmed that the first deliveries of enriched uranium to Brazil will begin at the end of this year. According to him, however, that has nothing to do with the possible noncontinuation of American deliveries. Furthermore, according to the contract with URENCO, the Brazilians are entirely free to use the fuel rods for a different powerplant than the one for which they were originally intended.

In Brazil it is assumed--in view of the fact that there is now one more reactor to be fueled--that the total amount or enriched uranium which Brazil is going to obtain from URENCO will also be increased. The Dutch URENCO spokesman said that the conclusion was entirely on the part of the Brazilians. He denied that there had already been contacts with Brazil concerning expansion of the deliveries. He added that if Brazil were to decide on balance to build one less atomic powerplant, such an expansion would be entirely unnecessary.

URENCO and Brazil

According to diplomatic sources in Brazilia, the Dutch parliament need not issue a definitive export permit for the deliveries which are to take place shortly, as was promised by the Van Agt government during the heated debates on this question in 1978. In fact, URENCO decided that the uranium for Brazil will not come from the Almelo enrichment plant, but from the one in the English city of Capenhurst.

Even so, the conditions for the deliveries which were set in 1978 remain in force. These conditions state that an attempt will be made to establish a storage regime within the framework of the IAEA (International Atomic Energy Agency) for the plutonium which will be eventually be produced in the processing of the expended enriched uranium. If, 2 years before that processing, no IAEA storage regime has yet been instituted, the three URENCO countries (England, Germany [FRG], the Netherlands) and Brazil are to establish a separate "ad hoc" storage regime together.

This question, however, has lost its urgency because Brazil has fallen several years behind in the execution of its nuclear program. The construction of the processing plant has been postponed indefinitely, although work is being done on a pilot plant for processing [nuclear wastes] on a laboratory scale. For that matter, diplomatic observers in Brazil point out that Brazil has continuously demonstrated its political desire to reach a settlement within the framework of the IAEA. The chairman of the IAEA commission working on a plutonium storage regime is himself a Brazilian diplomat.

6940
CSO: 5100/2019

BRIEFS

NUCLEAR ENERGY AGREEMENT--Cuba's Atomic Energy Commission and Bulgaria's Committee for the Peaceful Use of Atomic Energy have signed a bilateral cooperation agreement for the next 5-year period. The two sides viwed the document as very important for the future development of nuclear energy for peaceful ends in Cuba and Bulgaria. [Text] [FL210151 Havana Domestic Service in Spanish 0000 GMT 21 Nov 81]

CSO: 3010/332

CANADA TO PROVIDE NUCLEAR TECHNOLOGY IN 1982

Mexico City EL DIA in Spanish 5 Nov 81 p 8

[Text] During a press conference, the vice president for research of Atomic Energy of Canada, S.R. Haecher, remarked that a complete transfer of both reactor and heavy water technology would be made by Canada to Mexico in the bid to be submitted at the beginning of next year for the construction of a nuclear electric plant in Laguna Verde.

Yesterday, Dr Haecher participated in the seminar on the fuel cycle for the CANDU reactors being offered by Atomic Energy of Canada (AECL) to Mexican technicians.

The function was opened by the director of URAMEX, Francisco Vizcaino Murray, who thanked the Canadians for the enthusiasm that they have been showing for backing our country's nuclear program.

Moreover, Dr Haecher explained that the proposal that they would submit will involve the natural type of uranium, the plan for which was developed in his country to use the uranium and not depend on other countries for enrichment.

He also noted that the handling of fuel in the CANDU reactors is very simple, and it is unnecessary to stop and make a change in elements; adding in this regard that many of the components for the handling could be manufactured here.

The reactors being sold by Canada are for 500 and 850 megawatts, and the former, which are built in a period of 5 years, cost approximately $1.2 million.

He also observed that the only condition imposed by the Canadian Government on those interested in their reactors is that an independent commission of the International Atomic Energy Organization assume responsibility for seeing to it that the radioactive waste is not used for military purposes; because it is known that the fuel emerging from the CANDU reactors contains plutonium, which is generally used to manufacture the atomic bomb.

In conclusion, Dr Haecher said that the waste from their nuclear powerplants is stored in tanks located in the facilities themselves, so that a decision may be made later on a more suitable use thereof.

2909
CSO: 5100/2035

ENRICHED OR NATURAL URANIUM DECISION STILL PENDING

Mexico City EL DIA in Spanish 5 Nov 81 p 8

[Text] Upon being interviewed, Dr Carlos Graeff Fernandez, manager of the fuel cycle for Mexican Uranium, claimed that Mexico's nuclear program depends on a policy decision that has not yet been made, consisting specifically of an announcement of the line that the country will pursue in this respect, which could be natural or enriched uranium.

He also said that a program of this scope entails technical implications, because both kinds of technology have their advantages and disadvantages.

In response to a question as to whether this type of program should be put to the citizens for a decision, Graeff Fernandez emphasized that he did not agree, owing to its technical and political aspects.

Moreover, he stated that the decision to build the second nuclear electric plant in Mexico to fulfill the stipulations in the national energy program was already made at the time when authorization was given to open the bidding. What will be decided by the middle of next year, after an analysis of the bids from the seven participating companies, is what the country will construct. However, he disclosed the possibility that it might be two companies to which the contract would be granted.

Graeff Fernandez also noted that nuclear power could not meet the population's demand for electric power by the year 2000. It will contribute only a quarter, and the rest will be generated by conventional methods.

On another topic, Dr Graeff Fernandez said that the American bid to build nuclear powerplants in exchange for oil is good; however, Mexico realizes that, for its nuclear development, it requires a transfer of technology, so that our industry can participate in making some of the components.

In commenting on Laguna Verde, Dr Graeff said that the delay has not been due to obstacles posed by the American government, but rather to changes of policy.

Finally, he commented that the advantage of Mexico's deciding on its nuclear development with the two types of technology would be that it would not rely on a single supplier, which would afford us a broad margin for negotiation.

2909
CSO: 5100/2035

COUNTRY'S NUCLEAR PLANS EXAMINED

London 8 DAYS in English No 44, 7 Nov 81 pp 54-55

[Text] Though negotiations on the price of LNG will be at the heart of discussions during President Francois Mitterrand's state visit to Algiers at the end of November, the French will also seek to discuss Algeria's nuclear power plans.

Algeria's economic planners are seeking to diversify the country's energy supplies and officials at the ministry of heavy industry say that nuclear power could provide up to ten per cent of the country's electricity requirements by the end of the century.

Technicatome, a subsidiary of the French atomic energy commission, is to supply Algeria with a small experimental nuclear reactor, to be installed at the new nuclear research centre planned for Ain Dussera. Another French company, Sofratome, is carrying out a feasibility study for the construction of a 600MW pressurised water reactor. French diplomatic sources in Algiers told 8 Days that they expected the survey to be positive.

France, however, is not alone in seeking to provide Algeria with nuclear technology. At September's Algiers trade fair, Nicolai Rybakov, commercial officer at the Soviet embassy, announced that talks were to start between officials of the two countries on cooperation in nuclear energy. However, diplomats in the Algerian capital doubt whether, for political reasons, the President Chadli Benjedid government would choose the Soviets to build a nuclear power plant in the country.

The chances of other industrialised nations are probably better. Already, Britain, Canada, the US, West Germany and Belgium have expressed interest in the Algerian market for nuclear reactors. Algerian Minister of Finance Mohammed Hadj Yala even suggested to Brazilian Minister of Mines and Energy Cesar Cals last summer, that a form of South-South nuclear cooperation be organised between their respective states.

Nonetheless, Paris is by far the best placed to participate in the Algerian nuclear energy programme. France is one of the world leaders in nuclear technology and--nuclear power being a highly sensitive question--the Algerians would only sign a deal with a politically reliable partner.

Since Mitterrand came to power last May, the often-troubled relations between Paris and Algiers have significantly improved. The French head of state's trip to Algeria will seal the Franco-Algerian rapprochement and lay the foundation for long-term industrial cooperation, with nuclear energy being given a high priority.

Algeria has yet to sign the nuclear Non-Proliferation Treaty. Diplomatic sources in Algiers suggested to 8 Days that once the go ahead is given for the building of a nuclear power plant, the government could sign the treaty without much delay.

Algeria's considerable uranium resources in its Saharan provinces is also a major plus for its nuclear programme.

The state mining company, Sonarem, is intensifying its uranium mining programme. Work has already begun on the infrastructure for a new mine in the remote Hoggar mountain region, some 300km east of Tamanrasset. Production should begin in 1984, with capacity rising to between 1,000 and 1,200 tonnes by 1986, placing Algeria in the league of medium-size uranium producers like Gabon.

CSO: 5100/5002

NUCLEAR ENERGY PRODUCTION NOTED

Rabat L'OPINION in French 10 Oct 81 p 3

[Article: "Morocco Will Produce 280 Tons of Uranium Oxide Annually after 1984"]

[Text] Morocco will produce 280 tons of uranium oxide each year after 1984 and 2000 tons a year by the year 2000. This is what Ambassador Ali Skalli, the permanent representative of Morocco in Geneva, announced before the General Congress of the International Atomic Energy Agency (IAEA), recently held in Vienna. Skalli also announced that four 600-megawatt power stations will be put into service gradually after 1993.

As far as development of research and production of solid energy resources is concerned, "Morocco is giving particular attention to the uranium contained in phosphates or in deposits," Skalli declared before IAEA. In fact, the prospecting work which has been accomplished up to the present in the field has made it possible to detect promising zones, especially in Haute-Mouloya and the Imin Tanout area.

As for the uranium to be extracted from phosphoric acid, given that recovery techniques have reached a stage of industrial maturity, it was decided to construct a first extraction plant in Safi. This plant, which will go into production as early as 1984, will have a production of 280 tons of uranium oxide per annum.

The program will be pursued in connection with the construction of phosphoric acid production plants, and production of about 2000 tons of uranium oxide per year is expected to be reached. Morocco, which has at its command phosphoric acid production plants which are among the largest in the world, will thus be in a position to be the leading producer of the uranium contained in phosphates.

Morocco has also developed an electronuclear program in order to meet basic energy needs. Considering the evolution of power required on the national network, a first nuclear plant with an output of 600 megawatts could be operational toward 1993.

Assuming acceleration of the electronuclear program, the nuclear program envisaged up to the year 2000 will require gradually placing four 600-megawatt sections into service, starting in 1993. Given the time necessary to build a nuclear power plant (approximately 12 to 13 years), Morocco has already begun preliminary studies relating to site selection and the training of qualified personnel with the help of the IAEA, among others. The site selection study itself will be launched this year.

9380
CSO: 5100/5000

FAULTY EMERGENCY COOLING SYSTEM OF SOVIET-MADE REACTOR CAUSES CONCERN

Helsinki HELSINGIN SANOMAT in Finnish 28 Oct 81 p 17

[Text] Loviisa (HS) In its most recent report, the radiation safety institute, STL, draws attention to flaws that have been detected in the Loviisa 2 high pressure emergency cooling system.

The system has shown unusually many faults in the sealings, in the control of the emergency cooling pumps and in the transmission of electricity. Because of these imperfections in the equipment, further investigation will be conducted into the system. The faults also have forced a reevaluation of the technical and safety regulations concerning the operational conditions.

According to the report, the first half of 1981 was otherwise satisfactory at the Loviisa power plants, if the utilization factor is used as the measure.

Loviisa 1 produced electricity continuously until the maintenance break in late June. The utilization factor at Loviisa 2 became lower as a fire occurred in late June in the brush gear of a generator; this caused the power plant to operate only at half-capacity.

The utilization factor at Loviisa 1 was 0.935 in the first part of the year, and at Loviisa 2, 0.809. In Olkiluoto, TVO 1's utilization factor was 0.732 and that of the TVO 2, 0.398. Rotor faults were the biggest cause of trouble in Olkiluoto.

The most peculiar fault occurred in the TVO 1 nuclear power plant, where the person in charge of computing the amount of leakage in the valves got minutes and seconds mixed up with each other. As he computed the tightness of the insulation valves, he used wrong markings, and the computation error became 60-fold. When the mistake was detected, the amount of leakage was recomputed. In some of the valves, leakage was found to be greater than allowed.

The leaks of the valves in the containment building are significant in a serious emergency situation, because it is possible that radioactive matter might leak through them to the environment. However, the valves that were now leaking could not alone be responsible for the volume of leakage since there were also tight valves among them.

9571
CSO: 5100/2028

ERRATUM: NATION'S URANIUM FUEL SUPPLY STRATEGY DISCUSSED

[Editorial Report] Paris CEA NOTES D'INFORMATION in French on page 11 of its September 1981 issue carries a corrected version of a chart which originally appeared on page 17 of the journal's June 1981 issue. The original version of the chart was published in JPRS 79059 of 24 September 1981, No 116 of this series, page 35. The corrected chart is printed below.

France: Known Uranium Resources

10^3 t U	R.A.R. [1]	R.S.E. [2]	TOTAL
< 80 $/kg U	39,60 59,30	26,20 28,40	65,80 74,85
80-130 $/kg U	15,70 15,550	19,65 18,050	35,35 46,45
TOTAL	55,30 87,70	45,85 33,60	101,15 121,30

– 1979
– 1981 ◩ Δ = 20,15 10^3 t U

1. Reasonably certain resources
2. Estimated supplemental reserves

9679
CSO: 5100/2313

NUCLEAR AGENCY PROPOSES UNDERWATER STORAGE OF WASTES

Stockholm DAGENS NYHETER in Swedish 17 Sep 81 p 1, 12

[Article by Peter Sandberg]

[Text] At the beginning of next year SKBF (the Swedish Nuclear Fuel Supply Company) will apply for a permit to construct a final storage facility for reactor waste. According to the plans, it would lie 50 meters beneath the bottom of the sea off the coast of Forsmark and it would be put into use in 1988. It is estimated that it would cost about 1 billion kronor.

The facility is not intended for storage of spent fuel, but contaminated material from filters, materials that have been kept in a radioactive environment, etc. Such waste is classified as low and medium level waste and it is considered to be safe after about 500 years.

This waste is presently sealed in canisters or concrete containers at the various nuclear power plants. By the end of the eighties no more room will be available for it and a central storage place or expanded local storage places at the power plants will be needed.

Barseback will expand its storage space in the next few years, since its present areas are almost full.

SKBF's work on final storage of this waste was presented at a Nordic reactor waste conference in Kungalv on Wednesday.

"Many requirements had to be met. It must be near a nuclear power plant, have little groundwater flow, lie in rock, and be able to be back-filled and abandoned when it is full," civil engineer Gerold Lenge of SKBF said.

Special Ships

It was decided that Forsmark was most suitable and the bedrock off the coast was examined. The area chosen must lie at least 6 m under the surface of the sea so that after 1,000 years of land elevation it would not protrude above the surface of the water. The repository itself should lie 50 m below the bottom of the sea.

The waste, which is sealed in asphalt or cement at the power plants, would be taken by special ships to Forsmark. There it would be hauled through a 1,400 m tunnel down to the repository.

The latter would consist of four large tanks embedded in clay, a tunnel system, and two mined areas for low-level waste. The tanks would be divided into shafts in which canisters and concrete containers would be lowered and sealed over with concrete one by one.

When the nuclear power program is over and the power plants dismentled sometime around the year 2020, the repository would be sealed, the tunnel filled with broken rock, the pump turned off, the building at the tunnel entrace torn down, and the natural environment restored.

Veto Right

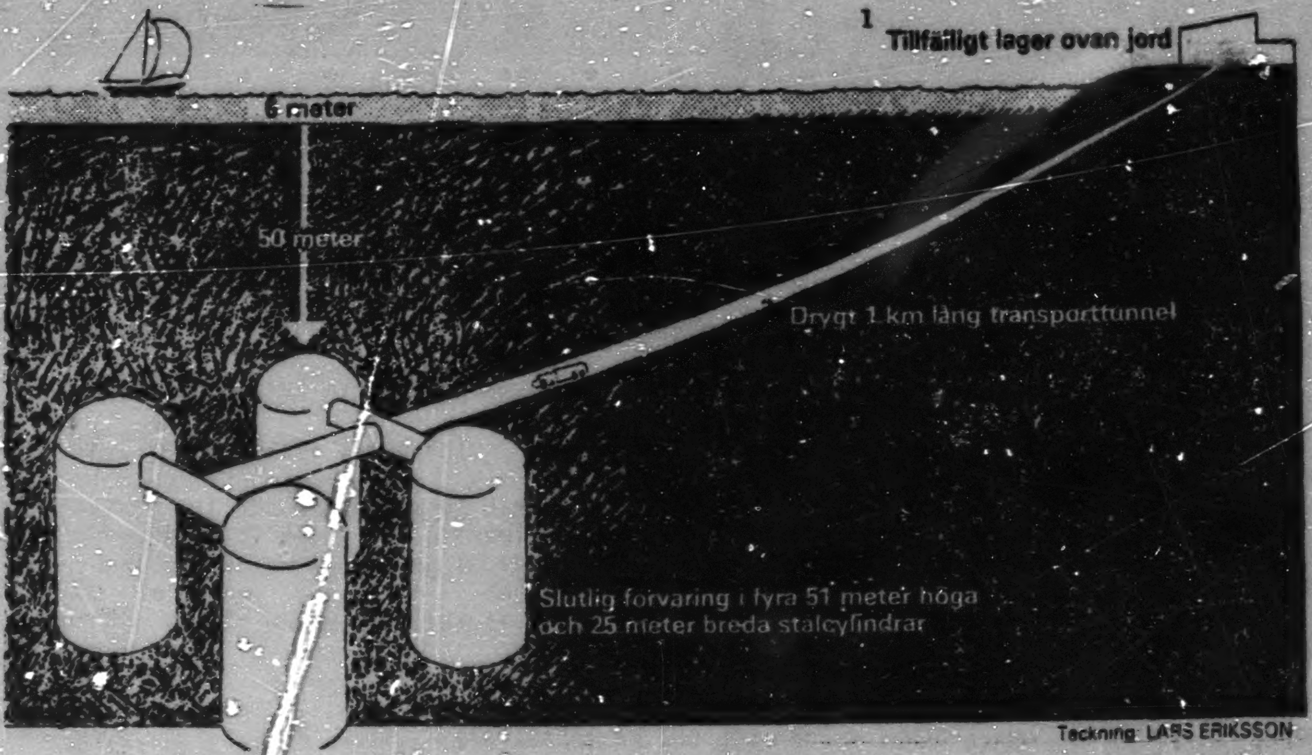
About 100,000 cubic meters of reactor waste will have been produced when the 12 nuclear reactors are shut down in 24 years.

"This structure has a very good margin of safety and, for this reason, quality requirements need not be especially high," Gerold Lange said.

The application will be presented next spring. It will be dealt with according to paragraph 136.a of the building code, which means that the municipality of Osthammar has a veto right.

SKBF estimates that the authorities will take 1 year to deal with the matter, construction will start in 1983, and operation will begin in 1988.

SKBF anticipates no problems in obtaining the approval of the municipality.


1
Tillfälligt lager ovan jord
6 meter
50 meter
Drygt 1 km lång transporttunnel
Slutlig förvaring i fyra 51 meter höga och 25 meter breda stålcylindrar

Teckning: LARS ERIKSSON

Key:

1. Temporary storage above ground
2. Transport tunnel, just over 1 km
3. Final storage in four 51 m high and 25 m wide steel tanks

9336
CSO: 5100/2025

FIRM DECIDES AGAINST MINING URANIUM IN PLEUTAJOKK

Stockholm DAGENS NYHETER in Swedish 17 Sep 81 p 12

[Article by Bo G. Andersson]

[Text] Reaction in Arjeplog was mixed Wednesday when it was announced that there would be no uranium mine in Pleutajokk. Opponents of nuclear power rejoiced, understandably enough, while the Social Democrats and Liberal Party officials could not hide their disappointment over the lost jobs and the way LKAB [the LKAB Mining Company] treated the community.

"It is extremely painful to lose 200 jobs and the future of this municipality seems quite bleak," said Kurt Burman, secretary of the Social Democratic Association and member of the municipal council.

"We have worked hard for years to open a mine and have assumed that LKAB's information on the amount of ore was correct."

"Now that the Swedish Nuclear Fuel Supply Company maintains that the quantity is not sufficient for an economically viable mine, we are astounded to say the least. In a way, we have been misled, deliberately or otherwise," Burman said.

Arjeplog is a typical sparsely settled municipality in Norrland. During the past 20 years the population has decreased by 50 to 100 people per year. Since 1959 one third of the people have moved away.

In Need

For this reason, reports in the early seventies of uranium finds in Pleutajokk promised salvation for the community in its time of need. The dream of an inexhaustible source of uranium was present from the beginning. "Here is our new uranium center," DAGENS NYHETER wrote in November 1973.

The expectations did not diminish with the years and in 1976 LKAB took over the study from SGU (Geolcgical Survey of Sweden). An agreement was reached 2 years later between LKAB and the nuclear power company SKBF (Swedish Nuclear Fuel Supply Company).

In December 1980 LKAB believed it had found enough uranium ore to apply for a mining permit from the government.

Even then, however, there were many critical voices within LKAB warning against the project, including Tibor Parak, director of LKAB's prospecting company. Parak was dismissed for his opposing views in this matter, among other reasons.

The critics pointed out that the uranium ore was found in narrow bands in the mountains and for this reason it would be expensive to mine. They also believed that radiation protection had not been sufficient during the exploration in 1980. The matter went so far within the prospecting company that an internal protest was made against LKAB executives. Environmental considerations would also be too expensive to the company, it was stated.

At the time, LKAB officials did not wish to acknowledge openly the internal reaction.

"Today the Pleutajokk deposits are well enough known that mining can proceed during the period nuclear power will be used in this country (25 years, DAGENS NYHETER's note)," vice-president Anders Erlandsson said as recently as March of this year.

In April the municipal council of Arjeplog voted by a one-vote majority to approve the project.

Reconciled

SKBF, which was LKAB's only customer, remained rather cautious throughout. Only several days after Erlandsson's optimistic statement, the company demanded new drillings to find out more about the uranium ore.

On Wednesday SKBF finally announced that it could not remain in the project because the quantities of ore were not sufficiently large. There was enough only for 5 to 6 years of mining, it was now said.

The idea of uranium mining, however, is by no means forgotten in this country. For several years SKBF has been conducting a project in Lilljuthatten in northern Jamtland. The company is conducting the project on its own and intensive exploration is underway.

The difficult talk of finding replacement jobs in Arjeplog now faces politicians in that municipality.

"We must now become reconciled with the opponents of uranium and solve this problem together," Kurt Burman said.

Wasted

A klinker plant, peat mining, and production of wooden chips are some of the alternatives that have been discussed in recent years, but the governing Social Democrats view these projects as unprofitable.

"Unfortunately, there are no ideas or projects that are comparable to the uranium mine," Burman stated.

LKAB and SKBF have invested almost 25 million kronor in the Pleutajokk mine. This money will have been wasted if the experience gained is not utilized elsewhere in the country.

9336
CSO: 5100/2025 END

JPRS 79730

24 December 1981

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 126

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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JPRS 79730

24 December 1981

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 126

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AGREEMENT WITH JAPAN ON NUCLEAR SAFEGUARDS STALLED

Snag in Talks

Melbourne THE AGE in English 12 Oct 81 p 3

[Article by Lorenzo Boccabella]

[Text] CANBERRA. — The latest round of talks between Australia and Japan on uranium safeguards has failed to reach an agreement to enable exports to proceed.

It is understood that among the issues still unsettled is the inspection of nuclear processing plants after production.

Some of Australia's uranium sales may be delayed if the negotiations are not completed before early next year, as the Federal Government will only allow exports to countries which have entered into safeguard agreements with Australia.

Japan has proved a difficult customer in negotiations for an agreement. Talks began in August 1978 and the latest negotiations represent the seventh round of formal talks. They are expected to begin again before the end of the year.

It is understood that some progress was made during the three weeks of talks in Tokyo. Officials will brief Ministers on them this week.

Possibility of New Talks

Canberra THE AUSTRALIAN in English 13 Oct 81 p 17

[Text] RANGER uranium exports to Japan will almost certainly, be delayed because Australian and Japanese officials have again failed to reach agreement on a nuclear safeguards code.

Another round of talks between the two delegations is likely to take place before the end of the year — possibly as soon as next month — in a last-ditch effort to thrash out an agreement.

But even if an agreement is reached before the end of the year, the export of U3C8 (uranium oxide) from the Ranger deposits in the Northern Territory to Japan is not expected to go ahead as scheduled.

Ranger now has contracts with the Japanese Government and electricity utilities amounting to 13,500 short tonnes of U3O8 between 1982 and 1996.

The mine is scheduled to start shipping uranium to Japan next March, but the Japanese Diet (Parliament) is not expected to have ratified the nuclear safeguards agreement by then.

The Federal Government's policy does not allow the supply of uranium to countries which have not signed such an agreement.

The Australian delegation arrived back from Tokyo last Friday after a marathon seventh round of negotiations.

The talks again broke down because of what the Japanese saw as threats to their national sovereignty, resulting from Australian inspection requirements.

A spokesman for the Department of Foreign Affairs yesterday refused to discuss details of the talks, but it is understood the Japanese are opposed to plant inspections by Australian officials. ...

Unresolved Enrichment Offer

Canberra THE AUSTRALIAN in English 15 Oct 81 p 15

[Article by Alan Goodall]

[Text] JAPAN is still waiting for a reply to its offer to help Australia form a uranium enrichment industry.

The Tokyo-based Committee for Australia-Japan Enrichment Study formed a month ago has received no response from the Uranium Enrichment Group of Australia (UEGA).

A Ministry of International Trade and Industry (MITI) spokesman said today the Australian group was considering its stand to the Japanese offer and one from the European uranium processor, Urenco-Centec.

He denied Tokyo reports that the Japanese committee had agreed to co-operate in a pre-feasibility study from next January.

The reports caused a stir in Japanese nuclear processing circles already keen to press ahead with full-cycle nuclear fuel reprocessing under relaxed Reagan Administration guidelines.

But the committee, the Japanese Government's watchdog in the nuclear industry, described the report as misleading.

The Japan Utilities Federation, a group of nine electricity supply companies, formed a committee in September to approach the promoters of an Australian enrichment industry, UEGA.

UEGA is a consortium of four companies, BHP, CSR, Western Mining and Peko-Wallsend.

The Minister for National Development and Energy, Senator Carrick, said recently UEGA was prepared to study at its own cost the setting up of an integrated uranium enrichment industry as a commercial venture.

Senator Carrick said the selection of a foreign technology holder to co-operate in the study would be made by the end of 1981.

The Japanese committee is anxious to co-operate in the venture.

Members see Australian-based enrichment as a logical extension of the uranium mining industry and a reliable supply source for their own electricity generation plans.

The utility companies are understood to be embarrassed by the Tokyo reports suggesting an early start by Japan in the studies.

In separate moves, MITI confirmed plans for a satellite search for world resources.

The ministry will begin constructing a satellite model in 1983 and check-out equipment for ground follow-up facilities.

CSO: 5100/7506

FRENCH NATIONALIZATION AFFECTS URANIUM MINING HERE

Canberra THE AUSTRALIAN in English 8 Oct 81 p 15

[Text] QUEENSLAND'S Government is facing embarrassment over a decision by the Mitterand administration in France to nationalise at least 11 French companies.

The companies include Pechirey Ugine Kuhlmann, which owns 50 per cent of Minatome, Australia, Pty Ltd.

Minatome will mine uranium reserves at its Ben Lomond site near Townsville, North Queensland, under an earlier-approved lease, and will start to produce by 1985.

Although Minatome's application for an extension of its mining lease, tailing stockpile area, and treatment-plant site has been refused by the Mining Wardens Court on the ground that it would be unsafe, indications are that Joh Bjelke-Petersen's Government may overturn that decision.

The Minister for Mines and Energy, Mr Gibbs, said last week that the best means of dealing with uranium was to sell it while there was still a world market for it.

But yesterday the co-ordinator of the Townsville Conservation Council, Mr Adrian Jeffreys, asked: "Now that Mitterand is preparing to nationalise half of Minatome, where does that leave Australia?

"The French Government — a Socialist administration with Communist members of the Cabinet — will still have a very aggressive nuclear policy.

"It would seem to be the height of irony that the Bjelke-Petersen administration could have what is a highly destructive socialist nuclear cell within its own borders."

Mr Jeffreys said it might be a good move by the Bjelke-Petersen administration to consider the whole future of its uranium policies.

CSO: 5100/7506

URANIUM PILOT PROCESSING PLANT PROJECTED FOR SOUTH

Perth THE WEST AUSTRALIAN in English 13 Oct 81 p 57

[Text]

The development of the Honeymoon uranium project in South Australia moved a step closer yesterday with the announcement that preparations were under way for the construction of a pilot processing plant.

North Kalgurli Mines Ltd, one of the partners, said in its quarterly report that a submission seeking full development status for the project had been sent to the Minister for Trade and Resources.

Pending this approval preparations for the construction of the plant had begun.

The Honeymoon deposit, containing about 3400 tonnes of uranium oxide is to be mined—using chemical solution . techniques—by a consortium consisting of North Kalgurli, Teton Australia Pty Ltd, MIM Holdings Ltd, and AAR Ltd, a wholly owned subsidiary of CSR Ltd.

The proposed mine site is about 75km north-west of Broken Hill in the Lake Frome district of north-east South Australia.

The directors also announced in the quarterly that samples from 67 drilling holes in an area adjacent to the Honeymoon deposit were being evaluated.

In November last year, the partners in the project announced that it would be the first in Australia to use solution mining, or a leaching method, to extract and process uranium deposits for the export market.

In a 74-page draft environmental impact statement also released in November, the partners said that a full-scale commercial plant would depend on the results gained from the pilot plant.

However, it was envisaged that such a plant would operate for seven to 10 years, producing an average of 450 tonnes of uranium oxide a year as dried yellowcake for international markets.

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Broken Hill
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CSO: 5100/7506

INDIA

SLACK IN NUCLEAR POWER DEVELOPMENT DEPLORED

Madras THE HINDU in English 13 Nov 81 p 8

[Editorial]

[Text]

THE NUCLEAR POWER sector is one in which the slide-back from proclaimed aims has been deplorably steep. Against Dr. Vikram Sarabhai's perspective plan for a capacity of 2,700 MW by 1980, there are just two stations in operation. These are the 420 MW powerhouse in Tarapur fuelled by enriched uranium and the Rana Pratapsagar station in Kota, Rajasthan, which uses ordinary uranium and is heavy water moderated. The second stage of the Rajasthan project was delayed by the Canadian collaborators' intransigence after the 1974 Pokaran explosion. A new setback has come about from a technical fault and leakage of water. The operation of Tarapur is endangered as a result of the disagreement with the U.S. on the supply of enriched uranium and a switch-over to an alternative fuel could lead to a long shut-down. The two units at Kalpakkam, near Madras, were originally scheduled to have come on stream in 1973 and 1976. The official expectation is to commission them next year and in 1984. The only other atomic station under construction is at Narora in Uttar Pradesh. No new project in this field has been sanctioned.

There are two obvious reasons for the slack in the development of peaceful uses of nuclear energy. First, the funding has by no means been liberal. Secondly, engineering abilities have fallen far short of original expectations although there appears to be international approbation for Indian scientists. Pure science is one thing. Translating drawing board concepts into projects on the ground is another matter.

The tentative plan is to add ten more units of the Narora type of 235 MW each. This will be a mirage unless the construction technology is upgraded and accelerated. The working group on energy policy, in its 1979 report, suggested that the country should aim at an installed nuclear capacity of 10,000 MW in a total of 100,000 MW of all powerhouses. Such a tenfold increase in 20 years in nuclear installations will be a big test for self-reliant technological advance. The present work on the design of larger generating units is only one aspect of the efforts for expansion. The tasks before the Department of Atomic Energy are indeed challenging, especially since the industrialised nations have ganged up to stifle development in this sector by the Third World countries which have refused to affix their signature on the dotted line in the discriminatory non-proliferation treaty.

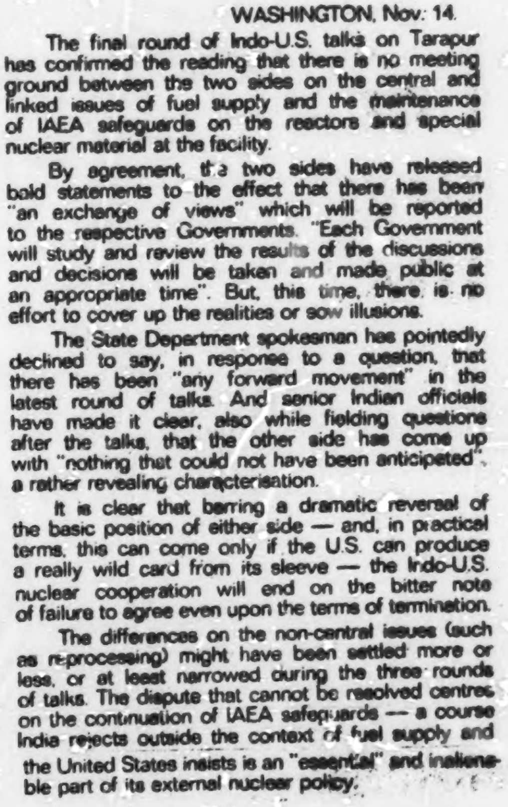
CSO: 5100/7022

TARAPUR TALKS PROVE DIFFERENCES WITH U.S.

Madras THE HINDU in English 15 Nov 81 p 1

[Article by N. Ram]

[Text]



WASHINGTON, Nov. 14.

The final round of Indo-U.S. talks on Tarapur has confirmed the reading that there is no meeting ground between the two sides on the central and linked issues of fuel supply and the maintenance of IAEA safeguards on the reactors and special nuclear material at the facility.

By agreement, the two sides have released bald statements to the effect that there has been "an exchange of views" which will be reported to the respective Governments. "Each Government will study and review the results of the discussions and decisions will be taken and made public at an appropriate time". But, this time, there is no effort to cover up the realities or sow illusions.

The State Department spokesman has pointedly declined to say, in response to a question, that there has been "any forward movement" in the latest round of talks. And senior Indian officials have made it clear, also while fielding questions after the talks, that the other side has come up with "nothing that could not have been anticipated", a rather revealing characterisation.

It is clear that barring a dramatic reversal of the basic position of either side — and, in practical terms, this can come only if the U.S. can produce a really wild card from its sleeve — the Indo-U.S. nuclear cooperation will end on the bitter note of failure to agree even upon the terms of termination.

The differences on the non-central issues (such as reprocessing) might have been settled more or less, or at least narrowed during the three rounds of talks. The dispute that cannot be resolved centres on the continuation of IAEA safeguards — a course India rejects outside the context of fuel supply and the United States insists is an "essential" and inalienable part of its external nuclear policy.

Although the official talks are over, Mr. James L. Malone, the Assistant Secretary of State who led his side in all three rounds of talks between April and November, has sought one more chance to "keep in touch" on Tarapur while he visits India in the first week of December in connection with co-chairing the meeting of the sub-commission on scientific and technological cooperation. And, should anything come out of this, there is the visit by the U.S. Secretary of State, Mr. Alexander Haig, in mid-December to be taken advantage of as a high-level political opportunity to follow it up.

As already reported in these columns, the attempt by the United States has been concentrated, from the New Delhi round in July, on making India keep the IAEA safeguards by finding a "new" external source of supply of low-enriched uranium fuel, preferably France or the Soviet Union. In fact, a supplement to the U.S. "non-paper" presented to the Indian delegation earlier makes this proposal explicitly — within the context of U.S. "flexibility" and willingness to take a "low-key and unobstrucive" role in the business, provided India agrees "voluntarily" to continue IAEA safeguards by forging a new external supply agreement with "a third country".

The associated effort is to deflect India from the mixed oxide fuel ("MOX") route for Tarapur — a decision taken at the Cabinet level and communicated to the United States. Reportedly, something in the region of Rs. 38 crores has been expended on the programme over the longer term, and the Indian side has authoritatively informed Mr. Malone and co. that there is no question of "retracing" the major steps taken, especially in terms of investment, in the development of the mixed oxide fuel.

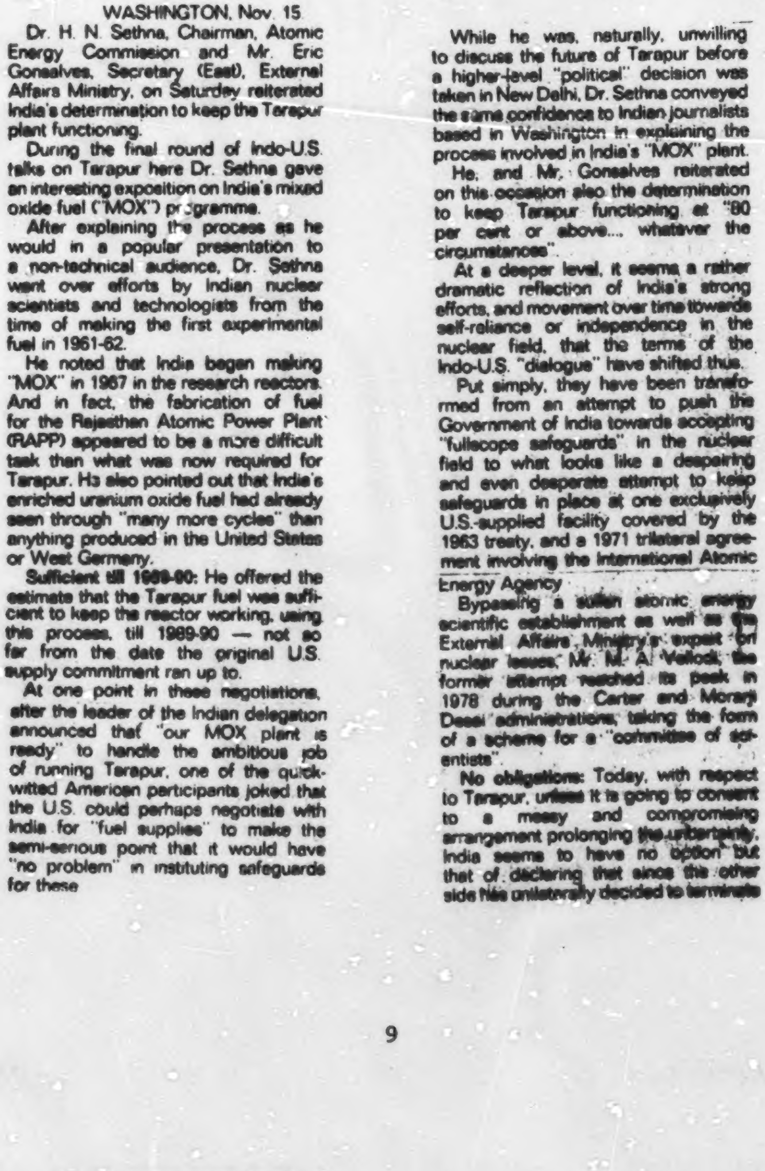
CSO: 5100/7023

CORRESPONDENT REPORTS FINAL ROUND OF TARAPUR TALKS

Madras THE HINDU in English 16 Nov 81 p 5

[Article by N. Ram]

[Text]



WASHINGTON, Nov. 15

Dr. H. N. Sethna, Chairman, Atomic Energy Commission and Mr. Eric Gonsalves, Secretary (East), External Affairs Ministry, on Saturday reiterated India's determination to keep the Tarapur plant functioning.

During the final round of Indo-U.S. talks on Tarapur here Dr. Sethna gave an interesting exposition on India's mixed oxide fuel ("MOX") programme.

After explaining the process as he would in a popular presentation to a non-technical audience, Dr. Sethna went over efforts by Indian nuclear scientists and technologists from the time of making the first experimental fuel in 1961-62.

He noted that India began making "MOX" in 1967 in the research reactors. And in fact, the fabrication of fuel for the Rajasthan Atomic Power Plant (RAPP) appeared to be a more difficult task than what was now required for Tarapur. He also pointed out that India's enriched uranium oxide fuel had already seen through "many more cycles" than anything produced in the United States or West Germany.

Sufficient till 1989-90: He offered the estimate that the Tarapur fuel was sufficient to keep the reactor working, using this process, till 1989-90 — not so far from the date the original U.S. supply commitment ran up to.

At one point in these negotiations, after the leader of the Indian delegation announced that "our MOX plant is ready" to handle the ambitious job of running Tarapur, one of the quick-witted American participants joked that the U.S. could perhaps negotiate with India for "fuel supplies" to make the semi-serious point that it would have "no problem" in instituting safeguards for these

While he was, naturally, unwilling to discuss the future of Tarapur before a higher-level "political" decision was taken in New Delhi, Dr. Sethna conveyed the same confidence to Indian journalists based in Washington in explaining the process involved in India's "MOX" plant.

He, and Mr. Gonsalves reiterated on this occasion also the determination to keep Tarapur functioning at "80 per cent or above.... whatever the circumstances".

At a deeper level, it seems a rather dramatic reflection of India's strong efforts, and movement over time towards self-reliance or independence in the nuclear field, that the terms of the Indo-U.S. "dialogue" have shifted thus.

Put simply, they have been transformed from an attempt to push the Government of India towards accepting "fullscope safeguards" in the nuclear field to what looks like a despairing and even desperate attempt to keep safeguards in place at one exclusively U.S.-supplied facility covered by the 1963 treaty, and a 1971 trilateral agreement involving the International Atomic Energy Agency.

Bypassing a sullen atomic energy scientific establishment as well as the External Affairs Ministry's expert on nuclear issues, Mr. M. A. Vellodi, the former attempt reached its peak in 1978 during the Carter and Morarji Desai administrations, taking the form of a scheme for a "committee of scientists".

No obligations: Today, with respect to Tarapur, unless it is going to consent to a messy and compromising arrangement prolonging the uncertainty, India seems to have no option but that of declaring that since the other side has unilaterally decided to terminate the supply relationship and is in clear "material breach" of the 1963 agreement by its "non-performance" on fuel supplies, the treaty has ceased to exist — and along with it, the obligations it carries, including safeguards.

This, of course, is a far cry from the "mutually agreed termination", that has provided the "framework" for the Tarapur talks from the moment Mr. James Malone, Assistant Secretary of State, opened them in Washington in April there is what looks like an unanswerable international law basis to the Indian stand. But the decisive, in a sense irreversible, step can be authorised only at the highest political level in New Delhi.

The United States has (as has been reported in these columns and repeated in a report on Saturday in the columns of the "Washington Post") issued warnings that the unprecedented dismantling of IAEA safeguards from a safeguard nuclear facility would have serious bilateral and international consequences. And here the executive branch has used the inevitability of a "strong" and "sharp" reaction from Congress as a lever in the negotiations.

If one were able to abstract, for the purposes of political analysis, from the details, the three rounds of talks over eight months seem to be not so much a negotiation over the present and immediate future of Tarapur.

The strong (at times crude) reaction by the Reagan Administration, the warnings uttered and implied, the tendency to blow hot and cold, the posture of "flexibility", the game of playing and surrendering all cards barring "safeguards" bearing a supply stamp (the principle embodied in article 6 of the 1963 agreement) clarify one process.

It is really a debate over the meaning of independence or self-reliance in the nuclear field, the first principle of which in international affairs is discrimination.

One side finds the development virtually impossible to swallow, although it knows it cannot run away from it. And the other side, India, finds that the painful process gone through, involving attempts at compromise underline the real strength.

The larger point about the advantages of self-reliance needs to be made at a time when a very major compromise has been instituted in the economic field, in the shape of the five billion SDR deal with the International Monetary Fund.

CSO: 5100/7025

WAYS TO END TARAPUR FUEL AGREEMENT CONSIDERED

Madras THE HINDU in English 17 Nov 81 p 1

[Article by G.K. Reddy]

[Text]

NEW DELHI, Nov. 16.

The Government of India, which has lost all hopes of terminating the Tarapur fuel supply agreement through mutual consent, has started exploring ways of ending it without any residuary obligations that are detrimental to its interests.

It proposes to wait until one more effort has been made at the political level next month, during the visit of the U.S. Secretary of State, General Alexander Haig, before finalising the modalities for unilateral termination.

A broad hint of how India intends to proceed will be given either by the Prime Minister, Mrs. Indira Gandhi, or the External Affairs Minister, Mr. P. V. Narasimha Rao, when the issue is raised in Parliament by members seeking details of what happened during the latest round of talks in Washington.

Diplomatic channels to be explored: Meanwhile, the Government will continue to explore through diplomatic channels the possibilities of an amicable termination that would free both sides of their commitments, if the U.S. is bent on going back on its solemn obligations.

The Secretary in the External Affairs Ministry, Mr. Eric Gonsalves, who returned today from Washington, gave the Government a detailed summation of the latest round of talks along with his own interpretation of the U.S. intentions.

He apparently came back with the distinct impression that the U.S. would strive hard till the very end to retain the safeguards after the termination.

U.S. move unknown: But it remains to be seen whether the Reagan Administration is going to exert undue political pressures in an avowed bid to compel India to agree to the retention of the safeguards either as a voluntary gesture, as it did in the case of the Rajasthan plant after the suspension of Canadian cooperation, or as a residuary obligation even after the termination of the fuel agreement.

The first hint of the U.S. intentions might be available during General Haig's visit, although it is equally likely that he might try to keep the issue in abeyance by simply not talking about it.

The U.S. Assistant Secretary of State, Mr. James Malone, who has been conducting the Tarapur talks, is also due to visit Delhi early next month to attend the meeting of the Sub-Commission on Science and Technology, before General Haig arrives later for the ministerial meeting of the Indo-American Joint Commission.

There will be some indication during Mr. Malone's visit whether General Haig would be coming with some new ideas on the subject.

Indian approach: The Indian approach is not to leave the initiative entirely to the U.S. which can afford to prolong the suspense after refusing to comply with its fuel supply commitments.

The External Affairs Ministry will not let go the opportunity to raise this issue with the new American Ambassador, Mr. Harry Barnes, when he calls on the Foreign Minister and other senior officials after the presentation of his credentials tomorrow to the President.

The new U.S. envoy was due to present his credentials on November 26 in the normal course, but the Government agreed to advance the date when it was found that the Egyptian Ambassador-designate who had arrived in Delhi earlier and was entitled to take precedence over him had not received his new letter of credence.

He had come with the letter signed by the late President Sadat which had to be replaced with a new one bearing the signature of the new President of Egypt before its presentation.

Fresh application filed recently: After India filed a fresh application recently for the supply of enriched uranium for 1982 in accordance with the prescribed time schedule, there are now three pending requests with the U.S. for the shipment of altogether 56 tonnes.

But there is no evidence of any inclination on the part of the present administration to release even the remaining one of the two shipments cleared in President Carter's time.

The former Secretary of State, Mr. Edmund Muskie, had assured the Foreign Relations Committee of the Senate in a letter last year that he would inform it of any material change in the Indian position, before actually shipping the remaining instalment.

Clear breach of contractual obligation: As there has been no futher Indian test or any violation of the safeguards part, the U.S. refusal to authorise even this shipment amounts in India's view to a clear breach of its contractual obligation.

In India's view, no further proof is necessary of the U.S. disinclination to abide by the terms of the agreement than this deliberate refusal to authorise even this single fuel shipment.

So the legal experts of the Government are maintaining that the U.S. has no locus standi at all to engage in any parleys for either determining alternate sources of fuel supply to keep the safeguards alive, or stand in the way of India's own plans to run the Tarapur plant with mixed oxide.

Agreement dead for practical purposes: A spokesman of the External Affairs Ministry made a brief statement today which was more or less on the same lines as what the Indian negotiators had said in Washington.

But it was quite evident from the tone and tenor of the comments made by other sources that the agreement was now dead as a dodo for all practical purposes and, if a decent burial could not be arranged by mutual consent, India would have to perform all alone the distasteful task of these funeral rites.

CSO: 5100/7026

BRIEFS

PROPOSED NUCLEAR SCIENCE INSTITUTE--Varanasi, Nov 14 (UNI)--The proposals for setting up Malaviya Institute of Nuclear Sciences in Banaras Hindu University is being revived after remaining in cold storage for two decades. Initiated in 1960-61 the proposal had sought to create a powerful centre for research in nuclear sciences in the northern region. A team from the Atomic Energy Commission had also visited the university in 1962 to discuss the project. The BHU was later asked to wait before implementing the project estimated to cost Rs. one crore at that time. Dr Shukla, Head of the Chemistry Department of the university says the scientists of Bhabha Atomic Research Centre, Bombay, have now evidenced keen interest in the salient features of the project and have assured to look into the proposal when received. Dr Shukla who is also the president of Indian Association of Nuclear Chemists which came into being earlier this month, expects the newly set up Association also to provide help in the implementation of the project. [Text] [New Delhi PATRIOT in English 15 Nov 81 p 4]

CSO: 5100/7024

DISCRIMINATION TOWARD THIRD WORLD NUCLEAR DEVELOPMENT CHARGED

Karachi BUSINESS RECORDER in English 28 Nov 81 p 2

[Editorial: "Nuclear Technology for Peaceful Purposes"]

[Text] Pakistan's ambassador to the UN, Niaz A. Naik, has recently drawn the attention of the world community towards the discriminatory attitude of the rich nations with regard to the development of nuclear energy by the developing countries like Pakistan. Speaking in the General Assembly on the report of the International Atomic Energy Agency, he said that it is great injustice to deprive the developing countries from acquiring nuclear know-how for peaceful uses in future on the pretext of control of proliferation of nuclear arms. He pointed out nuclear proliferation could be prevented only by an international regime covering both the nuclear haves and have-nots and not by unilateral restrictions. He reminded the Assembly of the existing IAEA safeguard system and said his country fully supported this system which guaranteed peaceful use of nuclear technology and prevented its use for other purposes.

The points raised by him are more than pertinent in the existing conditions when the industrially advanced countries have stepped up their opposition to free acquisition of nuclear technology and the ever rising oil prices have over-burdened their budgets. Their very survival is at stake unless they find some alternate source of cheap energy to meet their development needs. Nuclear energy provides the cheapest source of power in the long run. And it is for this reason that more and more developing countries are engaged in attaining nuclear capability to enable them to meet their long-term development requirements. Already there are about 240 nuclear power plants working in 22 countries generating about 1,25,000 MW of electricity. The International Atomic Energy Agency keeps a close watch under its safeguards system and regularly inspects nuclear installations to check that materials supplied for producing electricity are not diverted to non-peaceful uses. However, there are some industrialised countries which arbitrarily decide which countries should be given nuclear supplies without referring the matter to IAEA.

This is done for political reasons and is highly discriminatory. There are countries which have attained the capability to manufacture atomic weapons. But the same powers which apply all sorts of sanctions against the developing countries on the most flimsy grounds keep mum even after receiving the information of their having atomic weapons. Despite the fact that IAEA has been inspecting nuclear installations in Pakistan for the last 10 years and has certified that "the inspection disclosed no departure from the terms of the safeguards agreement covering the facilities and materials concerned", yet Pakistan's nuclear programme has been the target of deliberate propaganda all over the world and wilest of cooked up stories have been circulated and threats given. Not only that pressure was brought upon some countries which had entered into agreement with this country for the supply of necessary equipment to break the contracts which they did.

In a situation like this when it is necessary that an international agreement be there among all the states of the world, both nuclear and non-nuclear, covering access to and use of nuclear technology for peaceful purposes. It is only in this way that the threat of proliferation can be checked as well as the needs of the poorer countries can be met.

CSO: 5100/4507

BRIEFS

ATTACK ON PAX N-REACTOR--Lahore, Nov. 30--PLO AMBASSADOR TO PAKISTAN MR. KHAIRUDDIN ABDUL REHMAN SAID HERE TODAY THAT ISRAEL COULD LAUNCH AN ATTACK ON PAKISTAN NUCLEAR REACTOR AT ANY TIME LIKE ITS RAID ON IRAQI NUCLEAR INSTALLATIONS. He said Israel would do so because of Pakistan's and its people's consistent support for the cause of the liberation of Palestine. He was addressing a function to observe the International Day of Solidarity with Palestinians at the Pakistan National Centre. The Ambassador added that Israeli sources were observed a few days back as saying that Pakistan nuclear reactor would be their next target, but he said that Palestinians and Pakistanis would valiantly foil the proposed expansionist designs of Israeli aggression. [Text] [Karachi MORNING NEWS in English 1 Dec 81 p 1]

CSO: 5100/4508

ENRICHED URANIUM PURCHASE FROM USSR TO BE FINALIZED

Buenos Aires LA PRENSA in Spanish 25 Nov 81 p 2

[Text] Moscow (EFE)--Argentina will be purchasing enriched uranium from the Soviet Union, reliable sources in this capital city told the EFE agency today.

The enriched uranium purchase could take place before the end of the year, under the terms of the contract that the two countries are about to conclude.

An Argentine mission was recently in Moscow discussing the technical details of the transaction with the Soviet enterprise Techsnabexport. Buenos Aires authorities are currently studying those details.

Once the technical study of the contract is completed, it will probably be signed by the National Atomic Energy Commission (CNEA) of Argentina and the aforementioned Soviet enterprise, although this point has not yet been conclusively decided on.

Enriched uranium supplies from the Soviet Union would cover only part of Argentina's needs for peaceful purposes. Argentina uses natural uranium in its atomic powerplants and is a leader in this field in Latin America.

Nuclear Cooperation

Furthermore, according to the sources, we can expect an increase over the next few years in Soviet cooperation with Argentina in the field of nuclear powerplants. The USSR plans accelerated development of these plants over the current decade.

This sphere of Argentine-Soviet cooperation will bolster the strong economic ties between the two countries, which offer solid prospects for the future.

Trade between Argentina and the USSR will top $3.5 billion this year, with the balance heavily in Argentina's favor because of the huge grain sales that the country (one of the world's four leading producers and exporters of grain) has made to the Soviet Union.

Argentine grain sales to the Soviet Union so far in 1981 total more than 15 million tons.

In addition to grains, Argentina sells other important items on the Soviet market, such as meat, wool, hides, vegetable oils, sugar and manufactured goods, tubing in particular.

Argentina buys very little from the USSR, with sales limited to sodium dichromate and machinery.

Trade Balance

The Soviet Union is interested in leveling off its trade balance with Argentina, which is heavily in favor of the rich Latin American country.

To this end, an Argentine mission traveled to Moscow a few months ago and agreed to the purchase of $50 million worth of Soviet industrial goods. So far, however, purchases of only $23 million have gone through, and the remaining amount will have to be negotiated by other Argentine delegations that are expected in the USSR next January and March.

According to industry sources consulted in Moscow, an increase in Argentina's imports of Soviet goods would favorably affect the stability of the two countries' trade balance.

The impact would be favorable not only because a boost in imports would be a goodwill gesture by Argentina, but also because the Soviets are prepared to "recycle" this foreign exchange by making additional purchases from their main "partner" in Latin America.

8743
CSO: 5100/2047

BRIEFS

NUCLEAR WAR PREVENTION DRAFT--(NA)--An Argentine draft to prevent nuclear war has been approved by the first committee of the United Nations' General Assembly, the Argentine delegation to the UN informed the Foreign Ministry. The Argentine proposal includes a recommendation for every state armed with nuclear weapons to submit to UN Secretary-General Kurt Waldheim before 30 April next year a list of "opinions, proposals and suggestions aimed at guaranteeing the prevention of a nuclear confrontation." Those suggestions would then be studied during the second stage of meetings of the General Assembly, focusing on disarmament. The Argentine proposal also requests the secretary-general to submit a report containing those proposals, opinions and suggestions, together with those contributed by other UN member states. [Text] [PY292035 Buenos Aires HERALD in English 28 Nov 81 p 9]

NUCLEAR EXCHANGE WITH FRG--It has been reported that the first meeting for the implementation of the agreement signed by the National Atomic Energy Commission and the FRG Interior Federal Ministry was held in Buenos Aires on 23 and 24 November 1981. The agreement refers to the exchange of technical information and cooperation concerning the security of nuclear plants. [Buenos Aires LA PRENSA in Spanish 28 Nov 81]

CSO: 5100/2045

NUCLEAR AGREEMENT TO BE SIGNED WITH UK

PY021217 Rio de Janeiro O GLOBO in Portuguese 1 Dec 81 p 18

[Report by special correspondent Laura Fonseca]

[Text] London--Itamaraty announced yesterday that the negotiations regarding the nuclear cooperation agreement with Great Britain have ended successfully and that the document will be signed by Foreign Minister Saraiva Guerreiro and Lord Carrington during the last official meeting of the visit tomorrow morning.

The agreement is aimed at industrial cooperation and scientific research in areas in which Great Britain is well advanced, such as the treatment of atomic waste, security and the quality control of reactors.

An official Itamaraty source explained that as the Brazilian nuclear program is advancing, we will need to acquire first-rate technology in some phases of the cycle not covered in the Brazilian-FRG nuclear agreement. The document to be signed with Great Britain will thus complement the FRG-Brazilian cooperation.

Great Britain is interested in transferring nuclear technology and services to Brazil as a means of bringing down the cost of its own nuclear program, Itamaraty sources said.

Brazil needs cooperation in some key sectors of its program, such as the separation of radioactive elements in atomic waste, the treatment and storing of waste and scientific research in the field of nuclear fusion; the technology that will be dominant in the 21st century. The country already wishes to take the first steps in advanced technology in order to secure the continuity of the nuclear program and prevent it from becoming obsolete.

The document will have the form of a memorandum of agreement fixing sectors of immediate cooperation; it will serve, however, as a political basis for widening other cooperation areas in case of bilateral interest. Itamaraty has stated that the agreement has no connection with Angra I or any other specific reactors and can be used to cover needs of the Brazilian nuclear program as a whole.

Itamaraty explained that all opportunities should be taken advantage of to acquire scientific technology in the nuclear field, because these technologies serve as a guarantee for certain development with numerous applications in the industries of the future. The Brazilian Foreign Ministry denied that the cooperation with Great Britain is intended to replace parts of the Brazilian-FRG agreement, assuring that it is a scientific and industrial complement which will provide technological benefits for the nuclear program and other sectors of the country's economic development.

CSO: 5100/2041

BRAZIL

BRIEFS

NEW NUCLEAR POWER PLANTS--Sao Paulo, 22 Nov (TELAM)--Gen Jose Costa Cavalcanti, president of Eletrobras (Brazilian Electric Power Companies Inc) and of the Paraguayan-Brazilian binational organization ITAIPU, today said that Brazil will build two new nuclear power plants in Sao Paulo State in the year 2,000, in keeping with the Brazilian energy plan for that year. [Buenos Aires TELAM in Spanish 1230 GMT 22 Nov 81]

CSO: 5100/2041

SWEDEN HOPES FOR NUCLEAR PLANT CONTRACTS

Stockholm SVENSKA DAGBLADET in Swedish 6 Nov 81 p 26

> [Text] Swedish nuclear energy technology could get international recognition in Mexico. There are possibilities for extensive software and hardware deliveries here for the next few years.

"People at home do not realize what a fine position we hold in the area of nuclear technology," said Bo Persson, assistant director of the Asea subsidiary in Mexico. "In many ways, our position is better than that of our competitors.

"But there is also a drawback. In order for Sweden to sell nuclear energy technology here, there must be a working oil agreement with Mexico and that seems to be in jeopardy at present."

According to plans, Mexico will have 20 nuclear plants by the year 2000. The first two are under construction and the suppliers are American. Bids for two more plants are supposed to be in by February 1982 and the decision will be announced 6 months later. Asea-Atom has submitted a bid as have competitors from the United States, Canada and France. The bid concerns the reactor and the fuel production unit, but not the turbines.

Obvious Interest

The determination is far from being completed, but Mexico has shown obvious interest in long-term and intense cooperation with Sweden in the area of nuclear energy.

According to Bo Persson, the Swedish advantages are these:

"Sweden has learned how to develop nuclear energy on a limited scale, which also suits Mexico. Swedish nuclear energy technology is not only represented by Asea-Atom, but also Studsvik, Svensk Karnbransle-forsorjning, etc.

"That could possibly mean a coordinated effort. Together, we control the entire fuel cycle. Sweden has probably penetrated the fuel problem better than any other nation. No United States company knows all the technology."

Bo Persson added that Swedish-American cooperation in this area could lead to an important spin-off in Sweden, primarily in terms of component manufacture by subcontractors.

The Oil Problem

But back to the oil problem, which also concerns other Swedish interests in Mexico City. Mexico has decided to prioritize its economic connections, dealing only with a handful of countries, Sweden among them. When President Jose Lopez Portillo visited Stockholm in the spring of 1980 a Swedish-Mexican cooperative agreement was signed whereby Mexico would deliver 70,000 barrels of oil per day to Sweden.

Since then, the situation on the international oil market has changed considerably. Hence, Mexican oil, which is relatively expensive and consists partly of high sulphuric heavy oil, is less attractive.

Mexico determines the price quarterly and buyers--Swedish Petroleum (SP) and OK as far as Sweden is concerned--can opt not to buy the oil if they feel the price is too high. However, if the buyer decides not to buy a sufficient number of times, the contract is no longer valid.

SP and OK have decided not to import Mexican oil for the time being. The oil agreement is beginning to be viewed as a burden in Sweden.

"Shortsighted"

Carl Swartz, formerly Swedish ambassador to Mexico and presently head of the SE Bank's new office in Mexico City, thinks this is shortsighted.

"We only need to have something happen in the Middle East to completely change the market situation. One can understand the reluctance on the part of the two Swedish oil companies at this time, but as far as supplies are concerned, it is only good business to rely on a supplier outside the Middle East.

"Furthermore, Sweden's reluctance to buy oil seems to have affected Mexico's attitude toward us. Some of our competitors, who stopped buying oil when Mexico raised the price earlier this year, have since changed their minds and are now buying again. Sweden seems to have slipped a bit on the Mexican list of priorities," said Carl Swartz.

Important interests are at stake and Swedes in Mexico City stress that a solution to the problem is urgent. The time to negotiate desired adjustments in the oil agreement would be now when Mexico has some marketing problems.

8952
CSO: 5100/2038

BRIEFS

NUCLEAR AGREEMENT--Minister of Electricity Muhammad Mahir Abaza signed an agreement in Bonn yesterday for the construction by West Germany of two nuclear plants for the production of electricity in Egypt, at the cost of 5 billion German marks (1.85 billion Egyptian pounds). This is part of a program including the construction of eight nuclear plants by the year 2000. Minister for Research and Technology Andreas von Bulow, who signed the agreement on behalf of the Germans, said that his country considers the expansion [of usage] of nuclear power for peace purposes in the world necessary. Minister Abaza announced that the construction of the eight plants will provide 80 percent of Egypt's needs for [electrical] power through the year 2000. [Text] [Cairo AL-AHRAM in Arabic 27 Oct 81 p 1] 9455

REACTOR SITES--Detailed studies for the locations of four nuclear plants will begin next week in the al-Daya'ah region, which will continue for 30 months. Scientists from Egypt and France will participate in these studies. A responsible source in the nuclear plant organization announced that the program of study includes identifying the location for each nuclear plant. Each plant will produce between 900 and 1,000 megawatts. They will also identify water inlets and outlets for cooling and the area's electrical network as well as connecting it to the overall network in Egypt. They will also study the safety and security of the area and the ground water and its paths, as well as the construction of a special port for the site to receive heavy equipment that may reach 500 tons for each piece. The source also said that previous studies included the construction of a huge watchtower that will be 100 meters in height to study the direction of wind, degrees of temperature and rainfall in the area. The site proved suitable in accordance with international safety levels. [Text] [Cairo AL-AHRAM in Arabic 7 Nov 81 p 1] 9455

CSO: 5100/5001

KOEBERG NUCLEAR FUEL LOADING WILL BEGIN IN JUNE

Johannesburg THE STAR in English 14 Nov 81 p 3

[Text]

PARIS — South Africa is shipping enriched uranium to France to be turned into fuel elements for its nuclear reactor at Koeberg near Cape Town, a French company spokesman said yesterday.

The uranium is expected to reach France in the next few weeks.

It will take six months to convert it into fuel elements to start up the French-built nuclear plant at Koeberg, said the spokesman, Mr Jacques Goosens of Framatone, the building consortium's leading company.

Koeberg had undergone successful circuit pressure tests and should go into industrial production in December 1982, he said.

"The South African Electricity Supply Commission (Escom) is sending us the first consignment of enriched uranium, which will be manufactured into fuel elements in France and shipped back for the Koeberg plant" Mr Goosens said.

He added that the uranium was enriched at 3 percent according to specifications, but declined to give its origin.

Under a 1975 contract, South Africa is responsible for the supply of enriched uranium to the French processing plant.

"All I can tell you is that the enriched uranium does not come from France," Mr Goosens said. "Where it comes from is none of our concern."

The supply of fuel for Koeberg has been in doubt since 1978 when the United States banned the export of enriched uranium to South Africa until it had signed the nuclear non-proliferation treaty.

There is no indication in France that the US has relaxed its pressure on Pretoria.

Last year, reports from Johannesburg said South Africa had itself successfully produced enriched uranium fuel elements for its nuclear research reactor, Safari I at Pelindaba, outside Pretoria.

A limited quantity of 45-percent enriched uranium had been produced by the Uranium Enrichment Corporation (Ucor) and processed and manufactured into fuel elements by the Atomic Energy Board for Safari I, the reports said.

The South African enriched uranium will be converted into fuel elements by Franco-Belge de Fabrication de Combustibles, a subsidiary of the French Pechiney-Ugine-Kulhman engineering and chemical concern.

Loading of the nuclear fuels at Koeberg should begin in June or July, and the reactor is expected to go "critical" a few months later and start producing electricity by December 1982, Mr Goosens said.

The R800-million Koeberg power station consists of two pressurised water reactors, each with an electricity output of 922 megawatts. — Reuter.

CSO: 5100/5608

RECENT STATUS OF ELECTRONUCLEAR CONSTRUCTION VIEWED

Paris REVUE GENERAL NUCLEAIRE in French Jul-Aug 81 pp 305-317

[Article by M. Poyatos, assistant head of SEPTEN, head of the pressurized water type reactor in EDF, and Y. Peyrouse, engineer in the Project Coordination Department of SEPTEN, in EDF]

[Text] The authors describe the progress status and the situation of the 900-megawatt electric and the 1,300-megawatt electric PWR [Pressurized Water Reactor] sections under construction or in operation. In this context, they draw up a report on the starting up of the first 900-megawatt electric sections.

After tying 14 900-megawatt PWR sections into the network in 16 months (March 1980 to June 1981), the French nuclear powerplant construction program is witnessing the results of the efforts made since 1974 on the first industrial series (CP-1 Program) executed by the French Electric Company [EDF] in accordance with the objectives specified by the public authorities.

Construction of the second industrial series of 900-megawatt sections (CP-2 Program) and of the first 1,300-megawatt sections (P-4 series of eight sections) is continuing, together with these placings in operation, which follow the ones in the preseries consisting of the Fessenheim and Bugey powerplants (six sections started up between April 1977 and July 1979). In addition, the civil engineering work on the second series of 1,300-megawatt sections (P-4 series of 14 sections) is well underway at present.

Table I summarizes the main characteristics and dates of tying into the network and of placing in industrial operation of the pressurized water sections of the French nuclear electric program.

The basic options differentiating the various projects mentioned above were described in the REVUE GENERALE NUCLEAIRE Number 4 of 1980.

Fessenheim, Bugey and CP-1 powerplants: paired 900-megawatt sections, each consisting of a reactor building with a single vessel and gastight metal sheathing housing a three-loop primary cooling circuit. The turbine room, common to all the sections on the site, is arranged tangentially with regard to the reactor buildings and houses a turboalternator set for each section, whose turbine consists of a HP [high pressure] unit and three LP [low pressure] units.

CP-2 powerplants: 900-megawatt sections, equipped with a nuclear island identical with the one for the CP-1 sections, but with an individual turbine room for each section and located radially with regard to the reactor building. The turbine consists of one HP unit and two LP units. It should be noted that, although the CP-1 powerplants were cooled either by open circuit or by closed circuit, all the CP-2 powerplants are cooled by closed circuit atmospheric coolant.

P-4 powerplants: 1,300-megawatt sections not paired, equipped with a reactor building with double vessel without airtight sheathing, housing a four-loop primary cooling circuit. Moreover, the mass plan for the section provides for making physical separation of the nuclear safeguard auxiliaries possible by erecting a special building for housing them. The turbine room is radial and the turbine consists of one HP unit and three LP units.

P'-4 powerplants: 1,300-megawatt sections with a design similar to the P-4 sections, with, in particular, identical primary circuit and turboalternator set. These sections were perfected, with regard to the P-4 project, with a concern for reducing costs with an equal quality. This option finds expression primarily in a reduction of the size of the buildings.

It should be noted that the Saint-Alban and Flamanville sections consist of a P-4 type nuclear island and a P'-4 type turbine room.

I. Progress Status of the 900-megawatt Powerplants

A. Industrial preseries: Fessenheim-1 and 2 and Bugey-2, 3, 4 and 5.

The six sections of the industrial preseries started between 1970 and 1972 are all in industrial operation. As of the end of April 1981, the two Fessenheim sections had produced over 37 terawatt-hours (1 TWh = 1 billion kWh; 37 TWh ≈ 8.2 million tons of oil equivalent) and were in their third fuel cycle. Their average availability, including period of fuel reloading, was 71 percent at the times of the third year of operation, or definitely greater than the availability anticipated by the PEON [Production of Energy of Nuclear Origin] Commission (60 percent). Outside of reloading, availability has been 88 percent.

The four sections of the Bugey powerplant had produced a total of 42 terawatt-hours as of that same date and had all completed the first fuel cycle. Particular note can be taken of the performance of sections 4 and 5 whose availability in the first year after placing in industrial operation was 78 percent and 85 percent, respectively, (to be compared with the PEON assumption of 50 percent for that period).

The lessons that can be derived from these first years of operation are developed in another article in this same periodical.

B. CP-1 powerplants: Tricastin, Gravelines, Dampierre, Le Blayais

These powerplants were started in 1974-1976 with an extension of two sections in 1980 (Gravelines-5 and 6). With the exception of these two last-mentioned sections, this program is in process of completion with placing in operation of the number 4 sections of Tricastin, Gravelines and Dampierre scheduled during the summer of 1981.

Table I: PWR Section Construction Schedule

NOM DE LA TRANCHE (1)	TYPE	PUISSANCE ELECTRIQUE NETTE (2)	REFRIGERATION OUVERT/FERME (3)	DATE COUPLAGE PREVUE A L'ORIGINE (4)	(5) DATE COUPLAGE REELLE OU PREVUE	(6) DATE MSI REELLE	ETAT DE LA TRANCHE (7)
(8) I - PRESERIE INDUSTRIELLE (TRANCHES 900 MW DE FESSENHEIM ET BUGEY)							
FESSENHEIM 1		890	(11) OUVERT	6-75	4.77	12-77	(13) EN SERVICE
FESSENHEIM 2		890	OUVERT	4-76	10-77	3-78	EN SERVICE
BUGEY 2		920	OUVERT	8-76	5-78	2-79	EN SERVICE
BUGEY 3		920	OUVERT	6-77	9-78	2-79	EN SERVICE
BUGEY 4		900	(12) FERME	3-78	3-79	7-79	EN SERVICE
BUGEY 5		900	FERME	8-78	7-79	1-80	EN SERVICE
(9) II - SERIE INDUSTRIELLE DE 900 MW (TRANCHES DES CONTRATS PROGRAMME CP1 ET CP2 ET LEURS EXTENSIONS							
TRICASTIN 1	CP1	920	OUVERT	10-78	5-80	12-80	EN SERVICE
GRAVELINES 1	CP1	920	OUVERT	12-78	3-80	12-80	EN SERVICE
DAMPIERRE 1	CP1	900	FERME	3-79	3-80	12-80	EN SERVICE
TRICASTIN 2	CP1	920	OUVERT	5-79	8-80	09-80	EN SERVICE
GRAVELINES 2	CP1	920	OUVERT	7-79	8-80	12-80	EN SERVICE
DAMPIERRE 2	CP1	900	FERME	10-79	12-80	2-81	EN SERVICE
TRICASTIN 3	CP1	920	OUVERT	12-79	2-81	5-81	EN SERVICE
GRAVELINES 3	CP1	920	OUVERT	2-80	12-80	6-81	EN SERVICE
DAMPIERRE 3	CP1	900	FERME	4-80	1-81	5-81	EN SERVICE
TRICASTIN 4	CP1	920	OUVERT	6-80	6-81		(14) DEMARRAGE EN COURS
St-LAURENT 1	CP2	880	FERME	9-80	1.81		DEMARRAGE EN COURS
BLAYAIS 1	CP1	920	OUVERT	10-80	6-81		DEMARRAGE EN COURS
GRAVELINES 4	CP1	920	OUVERT	11-80	6-81		DEMARRAGE EN COURS
DAMPIERRE 4	CP1	900	FERME	1-81	8-81		DEMARRAGE EN COURS
St-LAURENT 2	CP2	880	FERME	3-81	6-81		DEMARRAGE EN COURS
BLAYAIS 2	CP1	920	OUVERT	6-81	4-82		(15) ESSAIS AVANT DEMARRAGE
CHINON B-1	CP2	875	FERME	10-81	2-82		ESSAIS AVANT DEMARRAGE
CHINON B-2	CP2	875	FERME	3-82	8-82		(16) MONTAGES ELECTRO-MECANIQUES
BLAYAIS 3	CP1	920	OUVERT	5-82	10-82		MONTAGES ELECTRO-MECANIQUES
BLAYAIS 4	CP1	920	OUVERT	11-82	2-83		MONTAGES ELECTRO-MECANIQUES
CRUAS 1	CP2	880	FERME	3-83	5-83		(17) ACHEVEMENT GENIE CIVIL
CRUAS 2	CP2	880	FERME	8-83	9-83		ACHEVEMENT GENIE CIVIL
CRUAS 3	CP2	880	FERME	2-84	1-84		(18) GENIE CIVIL EN COURS
CRUAS 4	CP2	880	FERME	8-84	7-84		GENIE CIVIL EN COURS
GRAVELINES C5	CP1	920	OUVERT	9-84	9-84		GENIE CIVIL EN COURS
GRAVELINES C6	CP1	920	OUVERT	5-85	5-85		GENIE CIVIL EN COURS
CHINON B-3	CP2	875	FERME	2-86	2-86		(19) DEBUT GENIE CIVIL
CHINON B-4	CP2	875	FERME	10-86	10-86		DEBUT GENIE CIVIL
(10) III - SERIE INDUSTRIELLE DE 1300 MW (TRANCHES P4 ET P'4)							
PALUEL 1	P4	1285	OUVERT	9-82	4-83		MONTAGES ELECTRO-MECANIQUES
PALUEL 2	P4	1285	OUVERT	2-83	11-83		MONTAGES ELECTRO-MECANIQUES
PALUEL 3	P4	1285	OUVERT	3-84	6-83		GENIE CIVIL EN COURS
St-ALBAN 1	P4	1300	OUVERT	8-84	8-84		GENIE CIVIL EN COURS
FLAMANVILLE 1	P4	1290	OUVERT	10-84	10-84		GENIE CIVIL EN COURS
CATTENOM 1	P'4	1270	FERME	4-85	4-85		GENIE CIVIL EN COURS
PALUEL 4	P4	1285	OUVERT	6-85	6-85		GENIE CIVIL EN COURS
St-ALBAN 2	P4	1300	OUVERT	7-85	7-85		GENIE CIVIL EN COURS
FLAMANVILLE 2	P4	1290	OUVERT	9-85	9-85		GENIE CIVIL EN COURS
CATTENOM 2	P'4	1270	FERME	1-86	1-86		GENIE CIVIL EN COURS
BELLEVILLE 1	P'4	1275	FERME	6-86	6-86		DEBUT GENIE CIVIL
NOGENT 1	P'4	1275	FERME	1-87	1-87		DEBUT GENIE CIVIL
BELLEVILLE 2	P'4	1275	FERME	4-87	4-87		DEBUT GENIE CIVIL
CATTENOM 3 ●	P'4	1270	FERME	9-87	9-87		(20) FIN TERRASSEMENTS
NOGENT 2	P'4	1275	FERME	11-87	11-87		DEBUT GENIE CIVIL
GOLFECH 1 ●	P'4	1270	FERME	1-88	1-88		(21) DEBUT TERRASSEMENTS
CHOOZ B-1 ●	P'4	1270	FERME	4-88	4-88		(22) SITE NON OUVERT
CATTENOM 4 ●	P'4	1270	FERME	7-88	7-88		FIN TERRASSEMENTS
PENLY 1	P'4	1290	OUVERT	9-88	9-88		(23) TERRASSEMENTS EN COURS
GOLFECH 2 ●	P'4	1270	FERME	11-88	11-88		DEBUT TERRASSEMENTS
CHOOZ 2 ●	P'4	1270	FERME	2-89	2-89		SITE NON OUVERT
PENLY 2	P'4	1290	OUVERT	7-89	2-89		TERRASSEMENTS EN COURS

[Key on next page]

Key:

1. name of the section
2. net electric power
3. cooling, open or closed
4. original date scheduled for tying into network
5. actual or scheduled date for tying into network
6. actual date of placing in industrial operation
7. section status
8. I - industrial preseries (Fessenheim and Bugey 900-megawatt sections)
9. II - 900-megawatt industrial series (sections of the CP-1 and CP-2 program contracts and their extensions
10. III - 1,300-megawatt industrial series (P-4 and P'-4 sections)
11. open
12. closed
13. in operation
14. startup in progress
15. tests before startup
16. electromechanical assembly
17. completion civil engineering
18. civil engineering in progress
19. start of civil engineering
20. end of earthwork
21. start of earthwork
22. site not open
23. earthwork in progress

* sites "frozen" (in the purport of the 30 July 1981 decision of the ministerial cabinet)

a. Tricastin-1, 2, 3, 4

The first three sections are in industrial operation and attained a production of 10 terawatt-hours in May. After a malfunction that occurred in the alternator of section 1 between the time of going critical and tying into the network, this section reached its nominal power in 41 days after tying into the network, or definitely less than the specified schedule (2 months).

Section 4 was loaded with fuel at the end of April and was tied into the network on 12 June 1981. This made it possible to provide the full power of the group of four sections (3.68 terawatts electric) for the summer of 1981. Most of the production was intended for the EURODIF uranium enrichment plant located in the vicinity.

b. Gravelines B-1, 2, 3, 4 and C-5 and 6

The first three sections are in industrial operation. Just like Tricastin-1, Gravelines section 1 was shut down for 2 months to correct some alternator problems. Total production of the site reached 10 terawatt-hours in May and section number 4 was loaded with fuel at the end of April and was tied into the network on 14 June 1981.

Sections 5 and 6 are in the civil engineering phase. As of the end of May, 134,000 cubic meters of concrete, or 61 percent of the total for both sections, had been poured. The last support frame of reactor building number 5 was welded at the beginning of June and the storage batteries for section 6 will be installed in mid-June. Concrete work for the section 5 turboalternator set base was accomplished at the end of April.

c. Dampierre-1, 2, 3, 4

Sections 1, 2 and 3 are in industrial operation. Loading of section 4 was scheduled in June and tying into the network in August. Production of section 1 amounted to 5 terawatt-hours at the end of April and production of section 2 was 2 terawatt-hours. It is to be noted that the time period between tying into the network and placing into industrial operation of Dampierre-2 was only 2 months. That time period is, at present, the shortest for all powerplants in operation.

d. Blayais-1, 2, 3, 4

The four sections of Blayais were started at two separate times. This explains the relatively large time lag between pair 1-2 and pair 3-4.

Section 1 went critical at the beginning of May and was tied into the network on 14 June 1981. Cold-testing of section 2 are starting and should make a fuel load possible at the end of the year.

Sections 3 and 4 are in the phase of installation of the heavy equipment. The The vessel for section 3 was delivered in April with several months delay, owing to factory repairs resulting from the discovery of defects under the corrosion-resistant steel cladding of the pipes. The Blayais 4 vession should arrive in July 1981.

C. CP-2 Powerplants: Saint-Laurent, Chinon, Cruas

The CP-2 sections were started in 1876-1979, with an extension of two sections in 1981 (Chinon B-3, B-4). Startup tests of the two Saint-Laurent sections have begun and make it possible to reveal the details of the turbine room, which is entirely new in comparison with the CP-1 sections.

a. Saint-Laurent B-1, B-2

Section 1 was tied into the network at the end of January 1981. Tests at 50 percent nominal power were performed in February. Then the section had to be shut down for 2 months for repair of the drier-superheaters. After restarting the facility, nominal power was reached at the beginning of June. Section 2 was loaded with fuel in February and went critical at the beginning of May 1981. It was tied into the network on 1 June, only 3 months after the date that had been set in 1976 when the project was started.

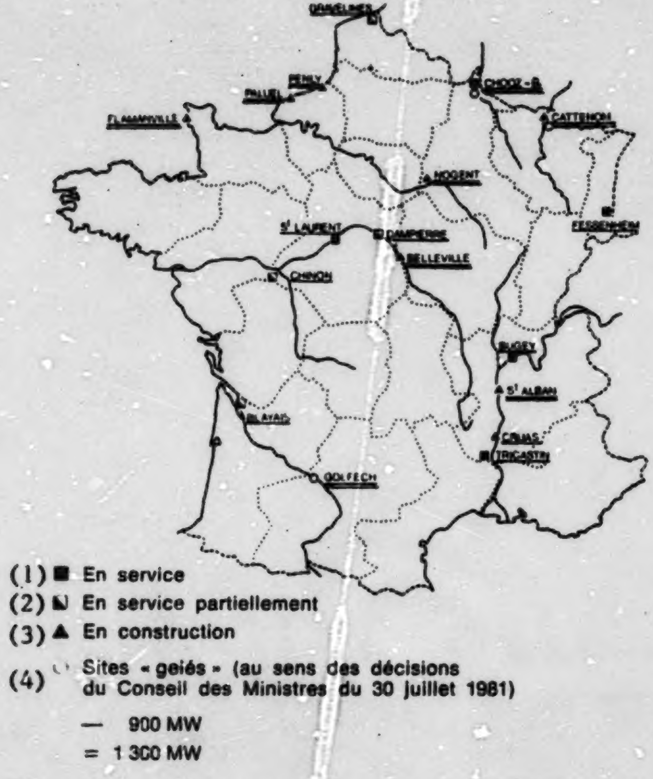
b. Chinon B-1, 2, 3, 4

At the same time as civil engineering is starting on sections 3 and 4, the electro-mechanical assembly is being completed on pair 1-2.

The first cold testing of section one with the vessel open has started and loading with fuel is scheduled for November 1981. The section 2 vessel was installed at the beginning of April and the first tests are scheduled in autumn 1981.

The Chinon B sections are characterized by forced-draft atmospheric cooling system (19 450-kilowatt fans). Tests on this new kind of cooling system were conducted successfully early in the year.

Nuclear Sites as of 1 August 1981


GRAVELINES
PENLY
PALUEL
FLAMANVILLE
CHOOZ-B
CATTENOM
NOGENT
FESSENHEIM
St LAURENT
DAMPIERRE
BELLEVILLE
CHINON
BUGEY
St ALBAN
CRUAS
TRICASTIN
BLAYAIS
GOLFECH
(1) ■ En service
(2) ◪ En service partiellement
(3) ▲ En construction
(4) ○ Sites « gelés » (au sens des décisions du Conseil des Ministres du 30 juillet 1981)
— 900 MW
= 1 300 MW

Key:

1. in operation
2. in partial operation
3. under construction
4. "Frozen" sites (in the purport of the 30 July 1981 decisions by the ministerial cabinet)

Preparatory work on sections 3-4 has been completed and 55,000 cubic meters of concrete, or 30 percent of the total for both sections, had been poured by the end of May. When those sections go into operation in 1986, they will mark the end of the 900-megawatt PWR section construction program, which will then have 34 units.

c. Cruas-1, 2, 3, 4

Cruas, the last 900-megawatt site to be opened, witnessed commencement of its assembly phase with the installation of section 1 heavy equipment. Two steam generators were put in at the end of April.

The vessel is scheduled to arrive at the end of December 1981 with 5 months delay over the initial planning. The dome of the section 2 reactor building was put in place at the beginning of May. By that same date, reactor building 3 was at

21 meters and the foundation had been poured at -3.50 meters for reactor building 5. The bodies of the first three atmospheric cooling plants are finished, as well as the inside of cooling plant number 1. The framework of turbine room number 1 is in progress, as well as the framework of section 2.

II. Demonstration of the Step Effect on Construction of the 900-megawatt Sections

Figure 1 shows, for the 900-megawatt sections that have reached a significant stage of progress, the delays in tying into the network with regard to the originally scheduled dates, which were based on a deliberately very restricting planning of a pressing nature. The solid lines represent tie-ins accomplished and the dotted lines the ones forecast.

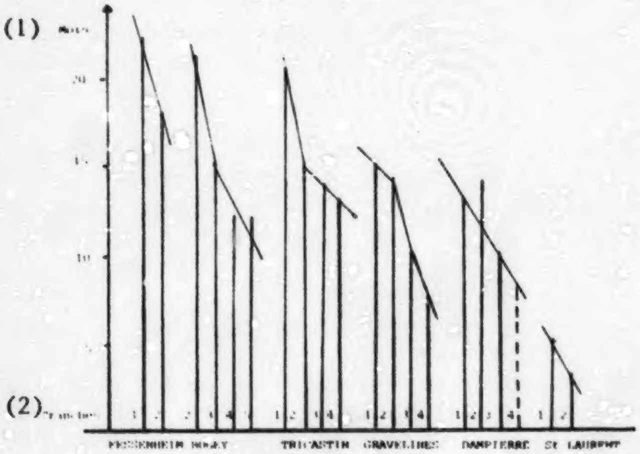


Figure 1: Tie-in delays with regard the dates originally scheduled.
Key: 1. months; 2. sections

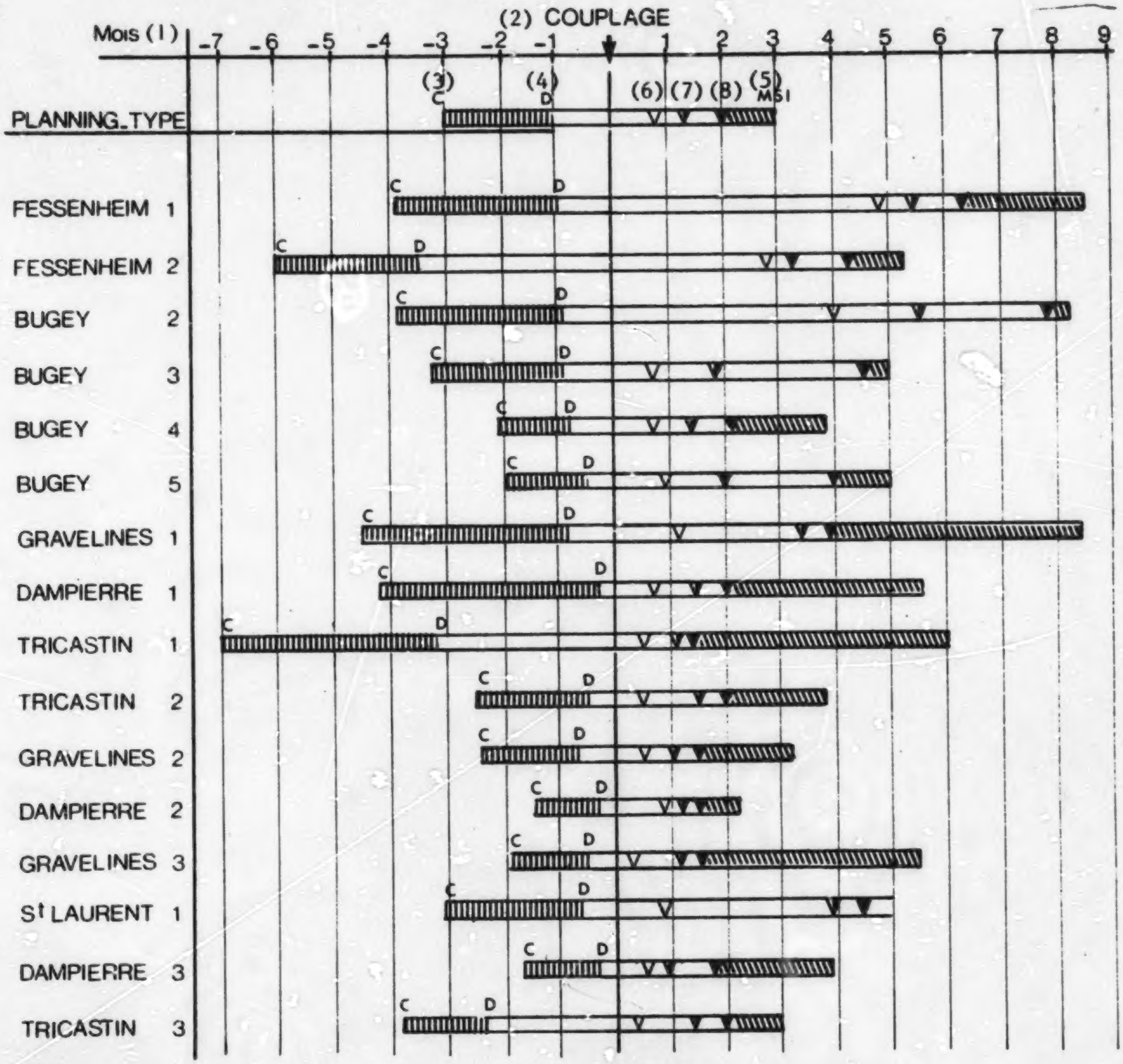
It is noted that the completion times decrease considerably from one section to the next for a given site, and from one site to the next, demonstrating the validity of the notion of the technical step effect making it possible to have the sections profit from the experience acquired on the preceding ones. Therefore, it can be thought that the small separation between two sections of one given site (6 months) did not allow this effect to work fully and that these results will be still more convincing for the 1,300-megawatt step where the separation between two sections is on the order of 10 months.

A peculiar point is observed at Dampierre-2, which is explained by a problem of welding on a primary pipe system that had to be redone. Nevertheless, this delay was utilized advantageously for preparing the starting tests that could be held in 4 months (the time period between loading and placing in industrial operation), or 2 months less than the typical planning.

III. Summary of the Startup of the First 900-megawatt SEctions

Table II shows the development of the startups of the first 16 900-megawatt sections. The times involved are to be compared with the scheduled nominal times: 3 months between fuel loading and tying into the network and 3 months between tying into the network and placing in industrial operation.

Table 11: Comparative Startup of the First Sixteen 900-megawatt Sections



Key:
1. month
2. network tie-in
3. fuel loading
4. criticality
5. placing in industrial operation
6. ∇ = 50% nominal power
7. ▼ = 75% nominal power
8. ▼ = 100% nominal power

This table shows the evolution between the first sections (Fessenheim, Bugey and sections 1 of Tricastin, Gravelines, Dampierre) whose average time between loading and placing in industrial operation was 10 months, and the following sections of CP-1 (Tricastin-2 and 3, Gravelines-2, Dampierre-2) whose average time between loading and placing in industrial operation was 6 months. This table also discloses a certain number of "abnormal" time periods resulting either from technical accidents or from procedures of an administrative nature. In particular, the

the long time between fuel loading and criticality of sections 1 of Tricastin, Gravelines and Dampierre was tied to an examination of the defects under the cladding of the vessel piping. The time between criticality and placing in industrial operation of those sections was due to problems encountered with the alternators, leading to a 2-month shutdown of each section. In addition, it is noted that the very short time period obtained for all the Dampierre sections between criticality and tying into the network (an average of 5 days), due primarily to the presence on the site of auxiliary boilers that made tests of the turboalternator sets possible before production of nuclear steam.

Table III gives the production of the sections in terawatt-hours during the first fuel cycle and also show the improvement in performance, on the one hand, between the sections of a given site (comparison of Fessenheim-1 and 2 or Bugety-4 and 5 with Bugey-2 and 3, and so on) and, on the other hand, between successive sites. This effect is entirely comparable with the one observed for construction times (see Section II, above).

Table III: Production at the End of n Months in Terawatt-hours, after Network Tie-in

			Months					
			3	6	9	12	15	18
	FESSENHEIM	1	~0	0,2	0,8	2,2	3,3	5,0
	FESSENHEIM	2	0,2	1,1	2,5	4,3	5,9	7,5
	BUGEY	2	~0	0,5	1,3	2,7	3,9	4,9
	BUGEY	3	0,4	1,5	2,5	3,1	3,8	5,7
	BUGEY	4	0,7	1,7	3,1	4,8	6,6	7,9
	BUGEY	5	0,5	1,9	3,2	4,9	6,7	8,4
CP1	GRAVELINES	1	0,2	0,9	1,5	3,3	5,0	
	DAMPIERRE	1	0,9	1,3	2,7	4,5		
	TRICASTIN	1	0,9	2,0	3,6	5,0		
	TRICASTIN	2	0,6	2,3	3,9			
	GRAVELINES	2	0,8	2,4	4,2			
	DAMPIERRE	2	1	2,7				
	GRAVELINES	3	0,9					
	DAMPIERRE	3	1					
	TRICASTIN	3	0,9					
CP2	ST-LAURENT	1	0,1					

It is observed, moreover, that Saint-Laurent-1, first in a series of an entirely new turbine room, experienced startup problems (driers-superchargers). This explains the low production value in the first 3 months.

Finally, it should be noted that the problems encountered with the alternators cost on the order of 2 months shutdown for sections number 1 of CP-1, or the equivalent of approximately 1.3 terawatt-hours, while the availability of the primary circuit was extremely high (≈ 90 percent for the entire CP-1).

IV. Progress of the 1,300-megawatt PWR Sections

Starting of work on the first 1,300-megawatt sections (Paluel-1) dates from 1977. Civil engineering work is well underway on the Paluel, Saint-Alban, Flamanville, Cattenon, Belleville and Nogent sites. Earthwork jobs have started at Golfech and Penly and the Chooz site is not yet open.

Construction of this kind of powerplant requires, in a period of full swing, around 3,500 percons on four-section sites and 2,000 persons on two-section sites. This personnel force consists, at the start, primarily of civil engineering teams, gradually replaced by electrical engineers and testing teams.

a. Paluel-1, 2, 3 and 4 Powerplant

The Paluel powerplant, which is the first 1,300-megawatt site in France, is in the assembly stage for the first two sections and in the civil engineering stage for sections 3 and 4 (there is a rather sizable gap--13 months--between section 2 and section 3).

The internal dome of reactor building number 1 has been completed since January 1981 and the four steam generators, as well as the pressurizer, have been installed. The vessel should arrive in July. Installation of the auxiliary piping system is 25 percent complete and delivery of the turboalternator set is in progress. The HP and LP rotors have been delivered to the site.

In section 2, the reactor building has been out of the water since October 1980 and the carrier for bringing in the heavy parts is operational.

For these two sections, the auxiliary steam and the demineralized water production functions are being tested, as well as the fans.

Delays of 7 to 9 months in tying these sections into the network are anticipated, primarily due to problems of manufacture of the primary equipment (vessel for Paluel-1 and steam generators for Paluel-2), in addition to a rather slow start of installation of the piping for the general electrical facilities. Nevertheless, general progress is very satisfactory in view of the head of series nature of the Paluel-1 and 2 sections.

The reactor building for section 3 is at the corbel support level of the treadway of the wing bridge and the foundation of reactor building 4 is concreted. With regard to section 3, 140,000 cubic meters of concrete have been poured and 30,000 for section 4 (for a total of 400,000 cubic meters per section pair).

The discharge structures are characterized by underwater tunnels discharging at about 1 kilometer from the coast. The tunnel for section 1 is finished and the earthwork for the discharge well is underway by means of a weighted platform resting on the sea bottom. The tunnel for section 2 is held up in its advance by sizable inflows of water (450 liters a second), requiring concreting of the tunnel in advance.

b. Saint-Alban-1 and 2 Powerplant

Only two sections are started on this site scheduled for four sections. Construction is still primarily in its civil engineering phase. Mechanical installations started on 15 April with the setting up of the swing bridge for reactor building 1 whose inner casing shaft is completed. The beams for the dome will be set up around 15 June 1981.

Concrete work on the foundation for the turboalternator set started on 15 May and 135,000 cubic meters of concrete have been poured in section 1, or about 80 percent of the total (this puts the progress of this section at the same level as the progress of Paluel-3).

In section 2, the outer casing of the reactor building is up to 26 meters, or the level of the material plug, and the amount of concrete poured is 80,000 cubic meters (47 percent of the total).

The intake channel is practically finished (92 percent) and the pumping station is 40 percent completed.

c. Flamanville-1 and 2 Powerplant

The Flamanville powerplant, of the same type as Saint-Alban, is running about 6 months behind it. Thus, in section 1, the level of the swing bridge should be reached on 15 August 1981 and the dome beams set up in January 1982. Concretework on the foundation for turboalternator set number 1 is scheduled in November 1981.

The Flamanville site, located on a cliff, is characterized by especially sizable earthwork, because the excavations made in the cliff served to fill up the platform of the turbine rooms, which was taken over from the sea.

The water intake jetties in the sea have been completed since the summer of 1980 and, at the pumping station, the casing for the first circulating pump has been poured, in addition to the overflow well for section 1 from where the sea discharge tunnel will start.

d. Cattenom-1 and 2 Powerplant

Two sections are scheduled on the Cattenom site. The civil engineering phase is in progress on these sections. Section 1, the head of series of the P'-4 stage, should be tied into the network in April 1985. Four years before that date, 73,000 cubic meters of concrete had been poured for section 1 (45 percent of the total) and 37,000 cubic meters for section 2.

In section 1, the outer casing of the reactor building is up to 40 meters and the inner casing up to 19 meters. The other buildings of the nuclear island have risen 5 to 10 meters above the ground. The piling for the turboalternator set foundation has been completed and the foundation is in process of reinforcement.

In section 2, the outer casing is at the +23-meter level and the basements of the buildings are finished. The solid mass under the foundation piling for the turboalternator set is being concreted.

The atmospheric cooling plant for section 1 has reached a height of 31 meters. The X posts and two embankments have been completed. The X posts for the second cooling plant are in process of concreting.

Belleville-1 and 2 Powerplant

The general earthwork for the Belleville powerplant is being completed with 4.28 million cubic meters of earth fill put in by the end of May 1981.

With regard to the main civil engineering, 82,700 cubic meters of concrete were poured in the two sections, or 28 percent of the total, excluding cooling plants.

Reactor building number 1 is at a height of 21 meters (or progress comparable with Cattenom section 2) and the foundation for section 2 is being laid.

The Belleville site is characterized by a more developed prefabrication experiment than with the preceding sites. The guidelines of the company responsible for the main civil engineering work provide for prefabricating between 400 and 600 20- to 50-ton packages of concrete for both sections. In addition, a number of 3- to 6 ton packages of reinforcement rods are provided for.

f. Nogent-1 and 2 Powerplant

Earthwork for the Nogent powerplant, which started in April 1980, is being continued at a daily rate on the order of 11,000 cubic meters of fill. The platform for the power station is practically finished with 2 million cubic meters used. Earthwork for the two large water intake and discharge basins is in progress.

The first cleaning concrete was poured at the end of April and the foundation concrete for the reactor number 1 pad was poured in mid-May. The first concrete for the structure of reactor number 1 was poured on 26 May.

g. Golfech, Penly and Chooz Powerplants

At Golfech, only the safeguard jobs, connected with protection against flooding, are in progress at present.

Considerable earthwork is in progress at Penly owing to the features of the site located on a cliff. At the beginning of May, the straight part of the frontal seawall was completed (770 meters long) and a 13-hectare area was won from the sea. The total combined excavation and fill amounted to 3.82 million cubic meters.

Opening of the Chooz site is scheduled depending on the program of the Economic and Social Development Fund for 1982-1983, but, as of now, location of the sections involved has not been definitely determined.

Acquisition of land has been suspended and construction work will not be started until a decision is made by the public authorities.

Conclusion

April 1977: the first 900-megawatt section tied into the network.

March 1980: the first section of the CP-1 multiyear contract tied in.

January 1981: the first section of the CP-2 multiyear contract tied in.

First half of 1983: scheduled placing in operation of the first section of the 1,300-megawatt PWR stage.

These few key dates mark the development of France's nuclear program whose effect produced by the sections in operation on the EDF grid is already very significant.

By mid-1981, almost two-thirds of the sections of the 900-megawatt stage (20 out of 24) are tied into the network and represent 18,000 megawatts and over 45 percent of the installed power of EDF's thermal grid. Likewise, since the end of 1980, 1 kilowatt-hour out of 3 produced by EDF has been of nuclear origin.

For the 900-megawatt stage, the Equipment Bureau anticipated a time period of 53 to 56 months with no margin and of a conducive nature between the order for making the nuclear boiler and tying into the network, depending on the type and location of the section on the site. Equilibrium was to be reached in 60 months (a shorter time was observed for Saint-Laurent B-1). This is a remarkable industrial performance, in comparison with foreign achievements. In fact, the experience accumulated as a stage developed, benefiting the subsequent sections, is one of the great features of the construction and placing in operation of the 900-megawatt PWR sections.

This acquisition is characterized:

By the "step effect" making it possible to take into account the difficulties encountered with the first sections.

By the "site effect" representing the experience acquired by the personnel responsible for tests and for operation.

The first phase, the civil engineering phase, is not experiencing any appreciable gaps between beginning and ending sections, because it is not very dependent on delays outside construction work.

On the other hand, the second phase, concerning primarily installation of the equipment on the site, generates gaps caused by the following:

Delays in supplying major components for primary circuit.

Time taken for execution studies, owing to modifications introduced with regard to the "series heads."

The third phase concerns tests on subassemblies, then cold and hot testing of assemblies. This phase, like the following ones, discloses the importance of the "site effect" that causes the subsequent sections of a site to benefit from the experience previous acquired by the personnel.

The fourth phase involves precritical tests preparing for criticality and then the low-power physical tests concluding with tying into the network. This period, closely connected with the quality of the preceding tests, is not experiencing any considerable delay gap, with the exception of aleatory events like:

The incident encountered on the Tricastin-1 alternator.

The supplementary inspections demanded by the Administration within the framework of the investigations pertaining to the defects under the cladding that could not be carried out in "time concealed" for the first CP-1 sections.

Starting with the tie-in into the network, the startup phase, strictly speaking, is entered. This phase ends with the placing in industrial service (MSI) marking the start of industrial utilization of the section without any special restrictions with regard to the grid. The time between tying into the network and the MSI date is on the order of 7 to 9 months for the first sections. Then it drops to 4 months and even less for the next sections.

Finally, it should be noted that, for 1980, the average availability of all the 900-megawatt PWR sections in industrial operation was greater than 85 percent, with the exception of shutdowns for fuel reloading and inspection.

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BREAKDOWN IN RINGHALS III NUCLEAR PLANT PROVES COSTLY

Stockholm SVENSKA DAGBLADET in Swedish 29 Nov 81 p 5

[Text] The cost of the breakdown at Ringhals III nuclear plant could be over 300 million kronor in lost revenues alone. Furthermore, it looks like Vattenfall will have to pay for most of the repairs despite the fact that the shutdown was caused by faulty construction that might be traced to the American supplier, Westinghouse.

Energy Minister Ingemar Eliasson explained to Parliament last Friday it may take up to 6 months before Ringhals III is back in operation again.

"Ringhals III delivers 915 megawatts, which means that if the price of energy is 10 ore per kilowatt hour the stoppage would cost in excess of 2 million kronor per day," according to Olle Blomqvist at Vattenfall. "But we do not expect Ringhals III to be out of service very long. We hope to have it functioning by Christmas."

Vattenfall's program is to plug the defective pipes in the steam generator so as to be able to start the plant and run it at a reduced output, making sure there are no excessive vibrations.

However, this program must be approved by the Nuclear Energy Inspection Board (SKI) before the reactor can be started again.

Neither Vattenfall nor SKI want to say how long it might take to completely repair Ringhals III.

It is clear, however, that Vattenfall will have to pay for all the repairs. Ringhals III was tested, delivered and accepted by Vattenfall so that Westinghouse no longer bears the chief responsibility.

However, Westinghouse is still responsible for Ringhals IV, which has already been built but which according to plans will not be loaded until April.

If it is proven there are some defects in the construction of Ringhals III that must also be corrected on reactor IV, Westinghouse will have to pay for work done on the latter reactor.

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